80 U.S.

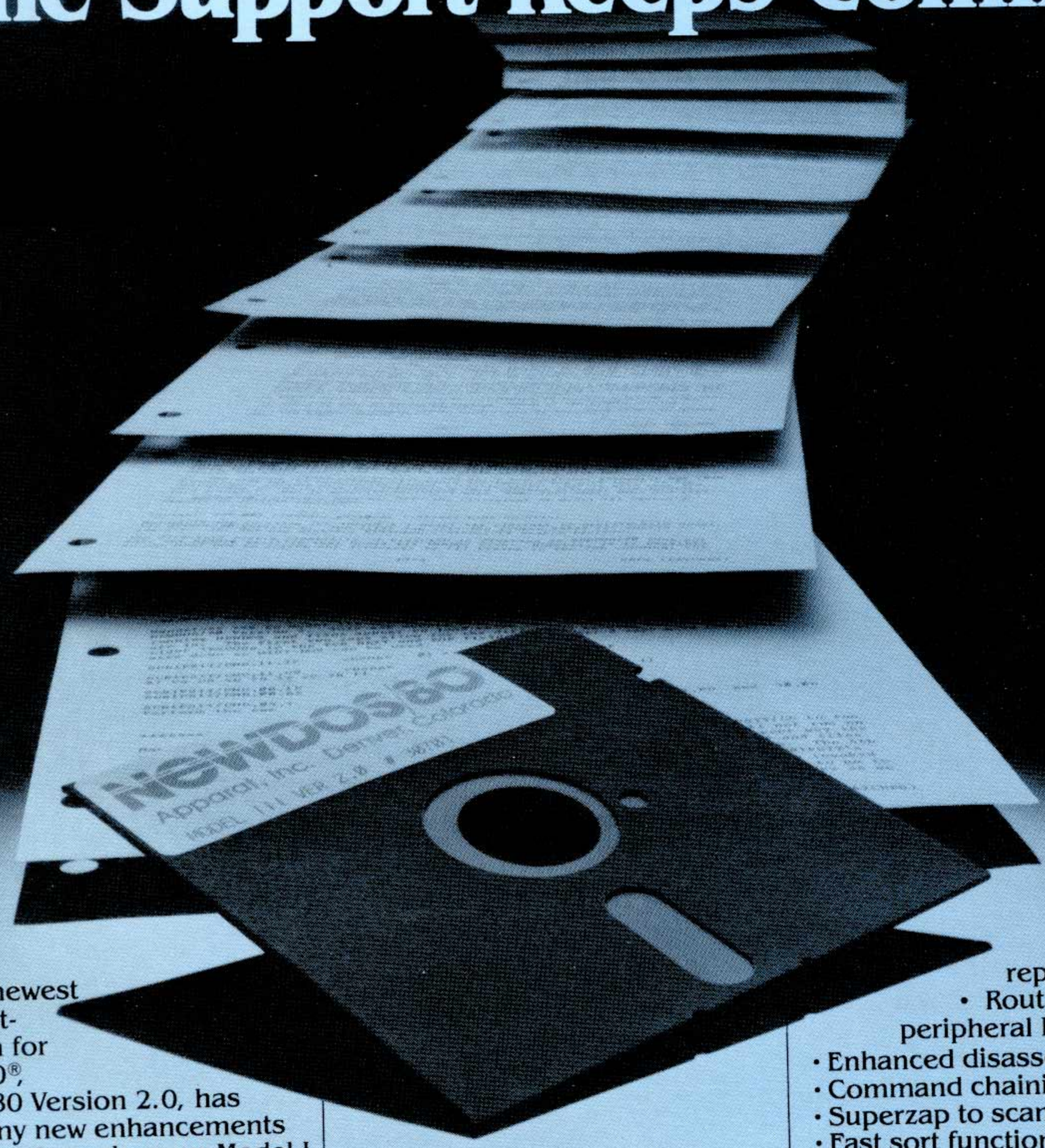
THE TRS·80 USERS JOURNAL.

Vol V No 2 $3.00 February 1982

Microcomputers and word processing

'Help for a dead language'

NEWDOS/80 Version 2.0
The Support Keeps Coming.



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Editorial

It has been said many times that there is no such thing as an "average" person. Dick Cavett, on his Apple computer television advertisements thinks he ran into one, but it turns out she owns a "small steel mill" and "dabbles" in gold futures. Andy Rooney, of 60 Minutes fame, appeals to the "average" person with his wit and witicisms, but are there really such people?

The microcomputer manufacturers, in their advertisments, are constantly trying to tell the public that "anyone can own and operate" a personal computer. "It's simple", they say, "you just push a button and there's your profit and loss statement".

You and I know that it's not *that* simple. You must know in advance what you want from a computer; you have to know how to get the computer to do what you want and then you must be able to interpret the results. Computers allow you to make big mistakes bigger and faster.

Lately, IBM has entered the personal microcomputer act. You've all read about it in the other magazines and *The Wall Street Journal.* I may not be the fastest person in the world, but I'm not the dumbest either. Still, it took me a whole evening to figure out their pricing structure. I used to be involved with mainframes, and it looks like they used the same pricing ideas in the microcomputer as they did there.

When Tandy Corporation first came out with the Model I, I thought it was clever salesmanship for them to imply that you couldn't hook a printer to the Level II, 16K machine without an expansion interface. Of course, the expansion interface gave you the ability to add memory and disk drives. So the advertised price of the basic computer was low, but you couldn't do anything serious with it until you had added another fifteen hundred or two grand to it.

It seems that IBM has up-staged Tandy by a mile or two. They did it so much better that you could spend weeks in the computer store, just asking questions (and probably not getting the answers you want).

Is the "average" person going to fall for all this? Probably. If they want in, they are going to have to pay the price. The manufacturers are all playing the same game with terminology and features. Until the average person understands it all, they will have their complicated pricing and get away with it.

There is something I have always wanted to do and couldn't afford it. It has to do with getting a so-called "average" person in front of a microcomputer and letting them have at it. All the while, of course, keeping copious notes about how they feel they are progressing towards the "computerized age".

That wish may have become a reality today. A large box was delivered via UPS from one of our advertisers. It contained a Model III with an 80 character by 24 line screen, a brand new operator manual and the Wordstar word processing software running under CP/M. There are several manuals and operating cards and a separate manual on the Wordstar system. It's here for evaluation.

Eva, our new receptionist and secretary, (whose voice sounds like she wants to crawl through the telephone line and kiss you before she asks what she can do for you), has no experience at all with computers. Since this new system is designed expressly for word processing, and since that is what Eva is here to do, it may just be a good idea to see how far she can go in setting up the system and getting useful output from it.

Heck, she may even write her first article for a nationally famous magazine and see her name in lights. Or maybe she will leave quietly one night and never come back. It may be an interesting experiment — and if Eva is willing, I think we should try it. The machine is still sitting there in the box — it hasn't even been plugged in yet.

Do you want to see how Eva does? I do. Let's go for it and see what happens. Who knows, she may fall in love with it and I'll have to buy her one to use all the time!

Mike

80-U.S. Journal

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ADVERTISERS: 80-U.S. Journal will accept relevant commercial advertising which pertains to, or is for use on, the Tandy Corporation microcomputers. Write for a current rate schedule.

AUTHORS: We constantly seek material from contributors. Send your material (double spaced, upper/lower case please) and allow approximately 4 to 6 weeks for review. Programs must be supplied in machine readable form on diskette or tape. Text files may be on diskette. Media will be returned if return postage is provided. Cartoons and photographs are welcome. Generous compensation will be made for non-trivial works which are accepted for publication. 80-U.S. Journal pays upon acceptance rather than on publication.

The Cover

Our cover for this month is intended to show the delights derived from the acquisition of word processing equipment. The model is none other than our own Cameron C. Brown. Frederick A. Johnsen is the photographer.

SUBSCRIPTION PRICE in the United States is $16 for one year, $31 for two years and $45 for three years.

Canada & Mexico: $25 per year, no two or three year subscriptions are offered.
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Contents

80-U.S.

THE TRS-80 USERS JOURNAL

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Volume V Number 2 **February 1982**

Features

Reviews

Departments

I typed in the very interesting program *Supergraph 1.0* by Davud Z. Korkut, as published in your Nov/Dec 81 issue. It works very well with my Epson MX-80 printer. However, I seemed to have had a problem with line 390 being too long.

The line listing seems to end abruptly (because it's too long) — I believe there should be *;DU;* after the last *PRINTUSINGFM$.* I had to insert *PRINT@ 835,;:PRINTUSINGFM$;DU;* as the first portion of line 400.

This was after deleting this phrase from the last portion of line 390. I then deleted the last portion of line 400 and put it in line 410 as follows:

```
410  PRINT@949+OF,;:PRINTUSING
                FM$;
              DU;:RETURN
```

I'm somewhat confused with line 10470 in that your printer produces a caret or circumflex apparently instead of an up arrow? Mine prints a left bracket instead. (I just referred to Dave Lien's *Basic Handbook,* page 409, and learned that this formatting will print the exponential or E form of a number!! You learn something every day!)

Lines 10730 and 10790 seem to have *surplus appendages* — I deleted the last *GOTO11030* in line 10730 and the last *),MD=CN:GOTO10510* in line 10790.

I think the program runs OK now (I hope the above changes are correct).

Daniel A. Armstrong
Las Cruces, NM

The movement of code into lines 400 and 410 will not cause any problems. The missing code was indeed due to the line being too long. Our testing of the program (as it came from Mr. Korkut) did not reveal the missing code or the extraneous material in lines 10730 and 10790.

We use the caret in place of the bracket (up-arrow) to prevent confusion. The program which does it is the standard printer filter included with LDOS 5.0 and 5.1. — Ed.

I am writing in regard to a program that ran in your Sep/Oct 80 issue - *A BASIC Z80 Disassembler.*

What is the assembled listing the disassembler gives and how is it broken down? How is a disassembler used both in ROM and RAM?

Carl Kellogg
Tacoma, WA

A disassembler produces listings of any machine language program residing either in ROM or RAM, in a form which may be used with an editor/assembler. The resulting output is similar in appearance to machine language listings published in this magazine. — Ed.

In the Nov/Dec 81 issue of *80-U.S.*, there was a hardware patch for the TRS-80 Model I to enable upper/lower case from the time that the system is powered up. When I read this patch, I said to myself, "Why not simply re-burn an EPROM with the corrected code?". Since the Texas Instruments and Motorola 2532 EPROMS are basically the same as the ROMs (with one minor exception), I could easily copy the ROMs into an EPROM programmer and edit them. So, I did. Also, I changed the byte at hex address 0418 to &H38 (JR C), in order to correct the keyboard driver. The only bad side effect that I found in doing this is that the @ key is now shift-@, and just pressing @ pauses BASIC execution. Oh well, we can't all be perfect.

The one minor exception is that pin 21, CE*, is active low on the TRS-80 ROM and active high on the 2532. This pin is hardwired to the active state in the TRS-80. However, with the *other* select line doing the actual selecting. This requires a jumper wire to pin 24 from pin 21, with pin 21 bent up.

Ralph Wade Phillips
Computer SOS Inc
4436A Youree Drive
Shreveport, LA 71105

Have you thought of relabeling your @ key as a "pause" key? — Ed.

It has been brought to my attention that there is an error in listing 2, which accompanied my article, *Hybrid Programming"* in the Sep/Oct 81 issue.

The last two digits in line 10 have been transposed: 28678 should be 28687.

It should be obvious that there are more than six data items, and that there are 16 and that 28672+15=28687.

I am sorry for any inconvenience any reader may have had due to this error. I discovered the error when a reader called me from Miami to report that it wouldn't run on his Model III. He loaned me a machine to try it on, and at first I was sure that it must be due to some subtle difference in the two models. Nope. It runs fine on both models with the transposition corrected.

R. B. Nottingham
Deerfield Beach, FL

In the beginning the battle raged betweeen the TRS-80, the Apple, the Pet . . . and a host of others. As computerists became more mature they realized that all computers could co-exist. Minor innuendos still crop up from time to time in the media, but few of us pay much attention to the childish, "My computer can lick your computer" type of ravings.

But there has evolved a more serious battle which can have far reaching effects on the entire outlook of the future of home computers. This is the battle between tape-based and disk-based systems. There appears to be a derogatory move afoot to fully support disk and leave the tape-based systems to fend for themselves. The reason I see this as a real threat to the future of home computers is that I can see evidence that more and more vital information is being put exclusively on disk. This is of a personal nature and does not concern me as much as the fact that if that disk system goes down, years and years of irrecoverable data could be lost by the individual.

My employer uses a DEC system with time-sharing and the works. They have invested millions of dollars in the hardware and software and it does provide a necessary supplement in getting the job done. But even they have realized the necessity of having a tape system as a back up and permanent storage of data.

I don't have to tell you the number of horror stories that appear in the computer magazines regarding what happens when a Disk Operating System decides it is time to wipe out an entire file, or take a notion to "rewrite" your important file with glitches. Back up disks offer some assistance, but if you have a "file wipe-out" problem then you can lose everything in a few minutes.

Tape, on the other hand, has permanent records which cannot be tampered with *on the cassette* by the computer. I have had many programs bomb out in memory and have had to turn off the computer, turn it on, save memory, and load the "fast tape" utility. But my original program is still perfect and intact on the cassette, ready to be reloaded whenever I want to. We have a dedicated laboratory computer at work and I have seen it eat disk data like a starving man eats his first meal.

Mind you, I am not saying that tape is better than disk or the other way around. I do say that both are necessary to the success of the computer hobby and small business and the attitude of "better than" should be curbed as much as possible and both systems supported to the fullest.

... I have been reading about "high quality" cassette recorders for use with computers. Is the Radio Shack CTR-80A such a recorder? Can you recommend other brands of recorders that have shown to be acceptable for computer use?

Robert Kyle
Minneapolis, MN

"High quality" is a subjective term. The CTR-80A is designed for use with the TRS80. Generally, you get what you pay for in tape recorders. The price of $59.95 for the CTR-80A is lower than most with similar performance. The only thing to watch for in tape decks is the amount of current drawn by the remote jack; if it is too high it will cause the relay in the TRS-80 to stick in one or the other position and render it useless. — Ed.

This Grizzly Looking Character Is Losing The Bug Battle!

TOO BAD! He continues to "WHIP" those miserable varmits the hard way . . . while the real answer is at his fingertips. He's not alone either! BUGS are an inevitable part of programming, and if you have ever tried to program in Assembly/Machine Language, you know exactly what we are talking about.

When we purchased our first TRS-80*, we were no strangers to machine language programming. We tossed out BASIC the first day, preferring to get right down to the nuts and bolts of things. What a shock! The Debugging Aids at the machine level were horrible! They were awkward to read, did not provide enough, or the right kinds of information, and required eight hands and gymnastic ability to switch from one command to another. Ridiculous!

WE DIDN'T SUFFER LONG!

Our first project was to create a truly powerful Debugging Tool. We called it *BUGOUT,* ran some advertisements, and sold a bundle of them. You know, the American dream come true. But that wasn't the end of our quest for a truly superior product. We asked every *BUGOUT* customer to give us their best ideas. Ideas that would make our product far superior to any other Debugger, and believe us, some of our customers are absolutely brilliant!

We received a truck-load of fantastic ideas, and you guessed it, we overhauled the original *BUGOUT* and created the most powerful, versatile, and easy to use Machine Language Debugger ever written for Mod I or III computers. . . BAR NONE!

HERE IT COMES

Our new Debugger is called *BUGOUT/PRO.* It is 11.5K of extremely powerful coding, and it is simply loaded with marvelous options waiting to come to the aid of beginner and expert alike. Anyone who is even remotely involved with Assembly/Machine Language programming can use *BUGOUT/PRO.* It comes with two manuals, one for beginners, with an INTERACTIVE course of instruction, and one for experts, with all the advanced features clearly spelled out.

WHAT DOES IT DO?

BUGOUT/PRO does all the things you would expect a Debugger to do, and more . . . a lot more! Beyond that, and even more important than what it does, is how it does it, how the data is displayed, and how easy it is to use!

You must *EXPERIENCE* the fast, flicker-free display, the utter simplicity of operation, and the huge variety of commands to make a fair appraisal of this product. No advertisement could possibly tell it all . . . so we are saving the best features for our *RISK-FREE* home examination.

RISK-FREE EXAMINATION

That's right, you can examine *BUGOUT/PRO* in your own home or office with our 100% guarantee of satisfaction. If *BUGOUT/PRO* doesn't live up to your expectations, simply return it for a full refund. What could be more fair?

BUGOUT/PRO sells for **$69.95** and is worth every penny we ask, and more! Just think of all the hours you've wasted searching for bugs. *BUGOUT/PRO* will make Assembly/Machine Language programming faster, easier, and far more enjoyable. Beginner or expert, *BUGOUT/PRO* is the Cadillac, Lincoln, and Rolls Royce of Debuggers rolled into one.

WILL THE BUGS WIN?

When you own *BUGOUT/PRO,* you are on the road to winning the bug battle. *BUGOUT/PRO* is supplied on TAPE or DISK, and either version automatically runs on both Mod I and Mod III computers. TAPE and DISK versions are identical, but be sure to specify which one you want. We accept Master Charge, Visa, Money Order, or Personal Checks. Foreign Orders and C.O.D.'s are $5.00 extra. Washington state residents add 5.3% sales tax.

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Thesaurus programs

REFWARE announces a set of three computer programs used to improve speaking and writing vocabularies. When the user types a word of his choice into the computer, the REFWARE Thesaurus will respond with suggestions of nine to forty five synonyms or associated words. Especially intriguing is the ability to substitute alternate words in the user's own sentence. The REFWARE Thesaurus also contains hundreds of "spelling demons" which help the user locate the correct spelling of many words. A REFWARE Thesaurus BUILDER is included which will chain together eight utility programs which enable the user to create a specialized thesaurus for the needs of a specific profession or business.

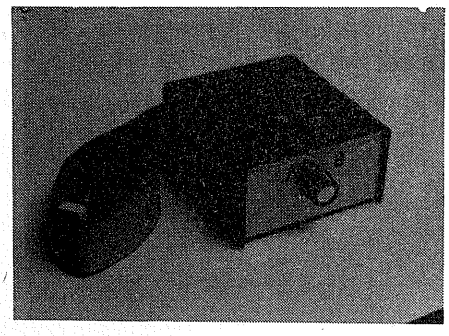
The programs are: REFWARE Thesaurus: Adjectives 1.0 (6200 adjectives) $39.95, REFWARE Thesaurus: Nouns 1.0 (6200 nouns) $39.95 and REFWARE Thesaurus: BUILDER 1.0 (program to develop specialized thesaurus) $149.95. Contact REFWARE, PO Box 451, Chappaqua, NY 10514 (914) 238-8896

Circle #127

Printer switch

Access Unlimited Computer Centers are now carrying the Arrick Products line of microcomputer device switching units. Quick-Switch units allow an operator to switch a TRS-80 printer output back and forth between two or three peripherals. These units are used in Access Unlimited stores to select between printers during sales demonstrations. A spokesman says that a three-port Quick-Print allows a salesperson to switch between an Epson and Okidata printer, and a Percom Electric Crayon color display system. Quick-Switch can also be used to switch one peripheral between two or three computers. For more information contact Connie Burnside, Access Unlimited, 401 North Central Expressway #600, Richardson, TX 75080 (214) 690-0206

Circle #134



Compactors I and IV

Hurricane Laboratories announces the release of Compactors I and IV. The Compactor I will allow the TRS-80 Model III to run CP/M applications and utility programs. When installed in the Model III the user can elect to use CP/M (2.2), TRSDOS, TRS-BASIC or Hurricane's Z80 Diagnostic Monitor.

The Compactor IV allows the TRS-80 to serve as an 80 x 24 video display and provides an RS-232 serial computer interface. It will be useful in applications which require an 80 x 24 video display. The Compactor IV allows the TRS-80 to be used as either a stand-alone computer or an intelligent terminal to larger host computer systems.

The Compactor I and IV are priced at $450 and $475 respectively. To order, contact Microcomputer Technology Inc.,(MTI), 3304 W. MacArthur, Santa Ana, CA 92704 (714) 979-9923

Circle #128

Income tax programs

Gooth Software is offering 40 Income Tax Programs on diskette for the TRS-80 Model I/III. The first disk includes programs for Form 1040, Schedules A, B, C, D, SE, TC and sells for $24.75 postpaid. The remainder of the 40 programs are available on other diskettes. For more information, write Gooth Software, 931 South Bemiston, St. Louis, MO 63105

Circle #129

Smart Color terminal

Eigen Systems introduces its new COLORCOM/E smart terminal program for the TRS-80 Color Computer. COLORCOM/E comes in a convenient ROM cartridge ready to plug in and run. Features include online and offline scrolling, receive and send cassette files, offline printing of data, support for any serial printer, full and half duplex operation and optional word mode to eliminate word wrap. Particularly helpful is the ability to easily edit data before printing or writing to cassette. COLORCOM/E also supports the automatic capture of files, as well as the ability to transmit cassette files with automatic capture characters. COLORCOM/E ($49.95) is available from Eigen Systems, PO Box 10234, Austin, TX 78766 (512) 837-4665

Circle #130

80 Space Raiders game

Bosen Electronics, 445 East 800 North, Spanish Fork, UT 84660 (801) 798-9553 has announced 80 Space Raiders, a starship simulator and combat game for the TRS-80 Model I, priced at $24.95.

Circle # 121

New book on FORTRAN

Dilithium Press announces the publication of a book for microcomputer users who have no experience with FORTRAN but are eager to implement it on their machines. *Microsoft FORTRAN* by Paul M. Chirlian, thoroughly explains the most popular FORTRAN available for the TRS-80. Some of the areas he highlights in the book are: top down programming, debugging, reduction of computation error and the Microsoft editor. Chirlian has also included exercises at the end of each chapter, a glossary and a list of built-in Microsoft FORTRAN subprograms. The 332-page book sells for $14.95. For further information contact Catherine Filgas, Dilithium Press, 11000 S.W. 11th Street, Suite E, Beaverton, OR 97005 (503) 646-2713

Circle # 123

Enhanced Hexspell

Hexagon Systems has released an enhanced version of its Hexspell spelling checker for the TRS-80 computer. The program, Hexspell 2, checks not just dictionary words but the complete text. Hexspell 2 learns and checks the codes, formulas and numbers common in many commercial and technical documents. The user defines which characters may make up a "word", then a single keystroke teaches Hexspell new "words" as it checks the text. Hexspell II orders its wordlist by frequency of use so that it adapts itself rapidly to a users vocabulary. The program comes with an initial 25,000 word list, which can be expanded to 50,000 words or codes.

Hexspell requires a 48K Model I or III with two drives. The program is available for $99.00(U.S.) from Hexagon Systems, PO Box 397, Station A, Vancouver, B.C. Canada V6C 2N2 (604) 682-7646.

Circle # 124

Wordsmith

ABS Suppliers, PO Box 8297, Ann Arbor, MI 48107 (313) 971-1404 has announced "Wordsmith", a word processing program for the TRS-80 Model I Level 2 disk or tape computer system. The tape version is written to support the B-17 Tape Operating System. Wordsmith is considered an ideal package for those who want to know what the more sophisticated word processing programs are all about without having to digest a big manual. It can easily be used by persons with little time for extensive training and practice. The disk version on tape (stock #311-D) and tape version (#311) are priced at $14.95 ppd with a 30 day money-back guarantee.

Circle # 122

Medical software

MICROMED Systems announces a computer system designed specifically for the DME (Durable Medical Equipment) dealer utilizing the TRS-80 Model II. The system features automatic posting of repetitive monthly rentals, prints medicare and insurance forms, patient co-insurance statements, mailing labels, word processing, monthly sales and rental analysis, detailed age analysis, procedure code reports, etc. Expansion into payroll, general ledger and inventory are available. Software and hardware both sell for less than $10,000. Contact MICROMED Systems, 25 South H Street, Lake Worth, FL 33460 (305) 588-8574

Circle #125

Astroball

Acorn Software Products, Inc. announced the release of Astroball - a pinball game with a space theme. This machine language game has even more of the high quality sound and graphics associated with the author - John Allen. It features space craft, flying saucers and black holes which devour your ball under certain conditions. Destroy enough meteors and you get a free ball. Acord would like users to send in their high scores. Astroball is available for the Model I/III on 16K tape or diskette for $19.95 + $2 s/h. Contact Acorn Software Products, Inc., 634 North Carolina Ave., S.E., Washington, D.C. 20003 or phone (202) 544-4259

Circle #126

Newsletter reprints

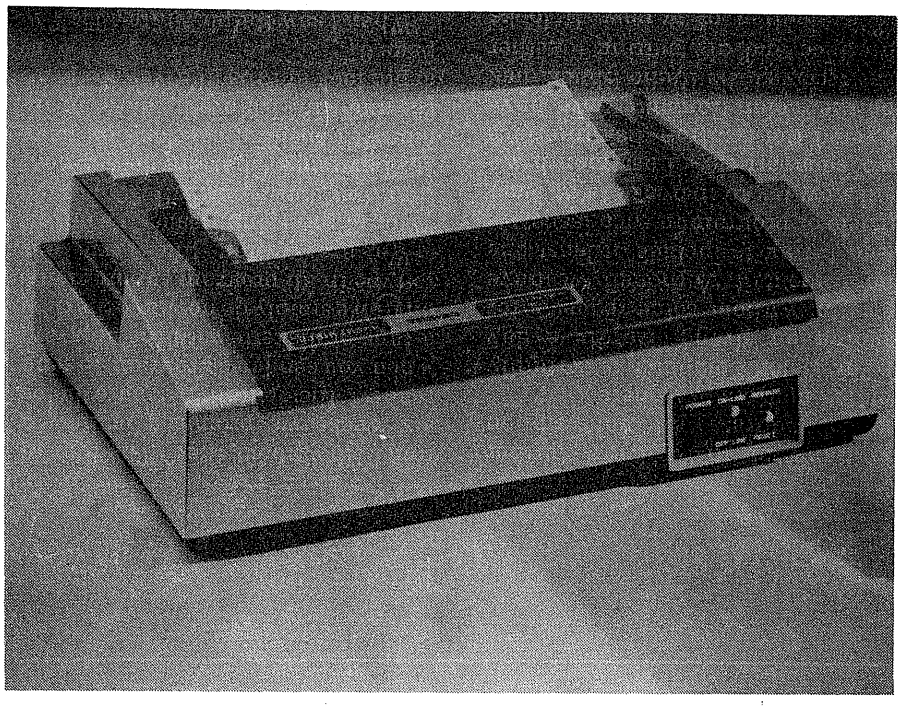
Radio Shack has collected the first twenty issues of the company's TRS-80 Microcomputer News into a special volume. Every issue from the very first through the one published in December, 1980 is included in the TRS-80 Microcomputer Newsletter Reprints (part number 26-2115), available for $4.95 from Radio Shack Computer Centers, stores and participating dealers.

Printer interfaces

Multi Media Systems, Inc., announces its two newest hardware printer interfaces: Models STP-1 and STP-2, for use with the Color Computer and a conventional parallel type printer. If the purchaser of the STP-1 already owns a Centronics-compatible printer, simple plug-in connections make the Color Computer see a serial printer, at the same time the parallel printer will see a parallel port. The STP-1 will accept serial data from the computer at a rate of 600 baud (default value for the Color Computer).

The STP-2 is identical to the STP-1 except it has a switch selectable baud rate which is compatible with the computer (300, 600, 1200, 2400). Full handshaking communications are supported with both interfaces without software overhead. The STP-1 and STP-2 sell for $79.95 and $99.95 respectively, plus $4.50 s/h. Available from Multi Media Systems, PO Box 41084, Indianapolis, IN 46241 (317) 839-6150

Circle #133



Sorcerer of Siva

Automated Simulations, Inc., has added a new title, Sorcerer of Siva, to its EPYX line of role-playing games. The player takes on the role of a wizard with a variety of magical spells. He must battle the evil sorcerer and a multitude of monsters as he searches through more than 300 chambers and five levels of the mine of Siva. A built-in scoring system challenges the player to make his way through the mine as quickly as possible and points are awarded for killing monsters and recovering treasure. Eight skill levels are used to determine the number of magical powers a player has and a graphic display draws each chamber as the player progresses through the mine. Available on cassette for TRS-80 Model I/III 16K or TRS-80 Model I/III 32K disk for $29.95. Contact Automated Simulations, Inc., PO Box 4247, Mountain View, CA 94040 (415) 964-8021

Circle #131

PAC Attack

Computerware introduces its PAC Attack game on cassette for the Radio Shack Color Computer. Three little muggers chase your man relentlessly around a maddening maze as you furiously try to build up points. This game offers graphics, sound effects and action at three levels of difficulty. $24.95 + $2 s/h. Contact Computerware, PO Box 668, 1472 Encinitas Blvd., Encinitas, CA 92024 (714) 436-3512

Circle #132

Host program

A M Electronics, Inc., announces their new software package entitled AMHost for the Model III microcomputer. The program is complete with user documentation and allows the Model III to become a standalone host for access via telephone by another computer or terminal. This permits a remote user to assume complete control of the Model III. Provisions for translation tables have been incorporated to permit user-definable translation codes should non-standard ASCII codes be desirable. For more information contact A M Electronics, Inc., 3366 Washtenaw Ave., Ann Arbor, MI 48104 (313) 973-2312

Circle #135

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Mike Schmidt (EDITOR) *80-US Jan/Feb pg. 94*

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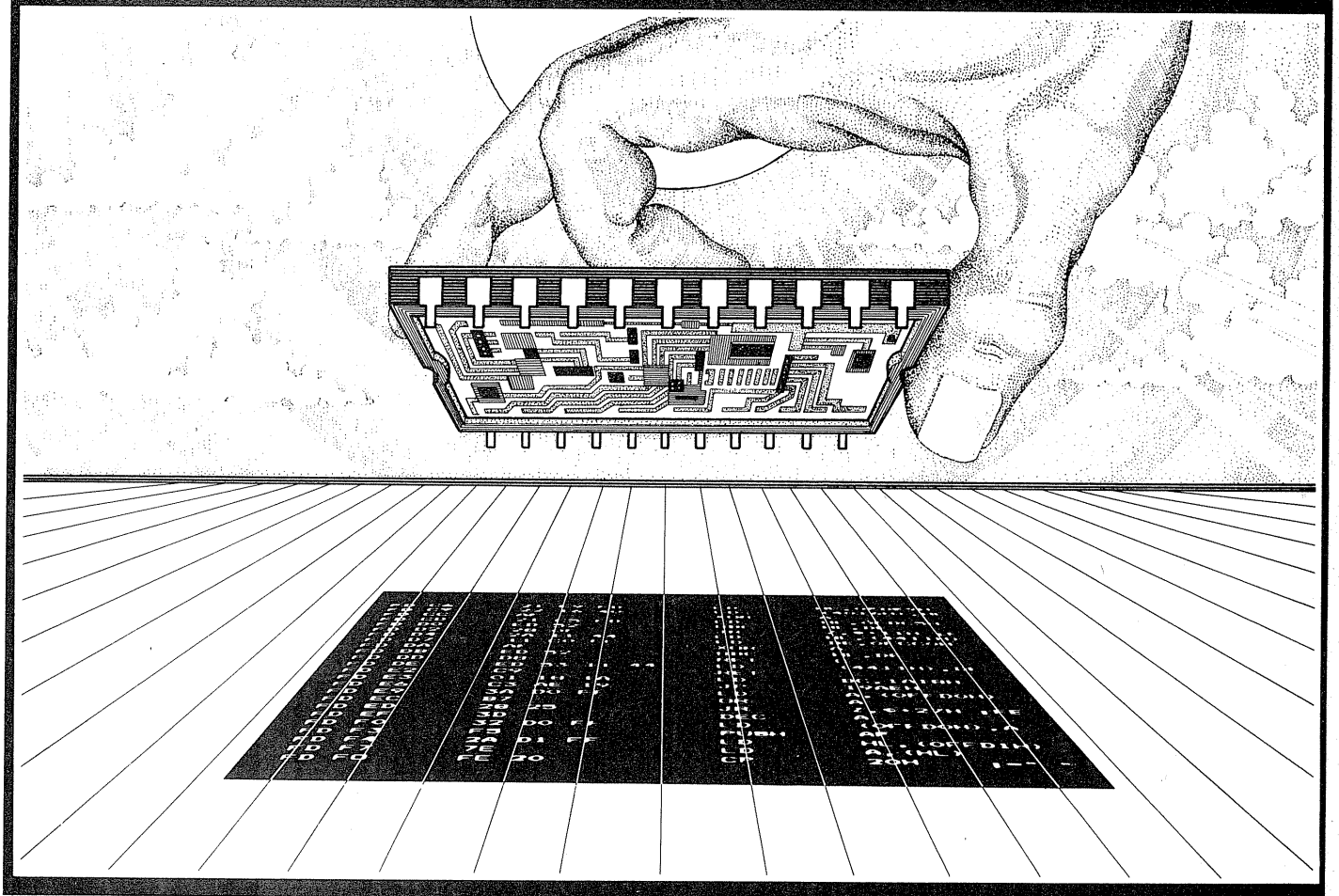
MACRO-MONITOR ...THE SHADOW



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This is the first real "monthly" issue of 80-U.S., and it still seems a little unusual to be referring to it as the "February" issue! We worried some about getting out on a monthly schedule, but with all the fantastic help and cooperation, we actually finished it a week ahead of schedule. How's that for overkill?

Our Editor, Tom Huber, who has been with us for the past year, has left for new challenges elsewhere. We all appreciate the good work he has done for us and wish him well.

Don Scarberry, who was assistant Editor, is now the Editor of *80-U.S. Journal*. Don's previous experience in retail sales management, and his education in electrical engineering and computing will probably show through in his new job as Editor. Welcome aboard, Don!

Our BASIC Adventure book finally arrived the day before Thanksgiving. It had been held up in a snowstorm in North Dakota and Montana (on its way from Minneapolis). It turned out even better than we thought it would, and we're proud to present it. Initial sales are doing very well. George Blank, who you all know is the Editorial Director for *Creative Computing* magazine, had this to say about it: "Well done, highly readable, easy to use. The book is a delightful adventure." Thank you George, for the encouragement.

We mentioned last issue that we were going to a subscription service. It is well under way now and about half completed. There are literally dozens of things to consider in a move like that, and we are running into them, one after another. The label on this copy, for example, was printed in Illinois and sent to the printer in South Dakota. Next thing is to have all orders and renewals sent directly to the agency. The reason for mentioning this is that even though we don't expect too much of a hassle, there may be an occasional glitch in the crossover. So hang in there. Until further notice, address all subscription related matters to us here.

The Color Computer is certainly coming on strong. Hardly a day goes by without some requests for more about it. Although we have been trying to include at least one article or program in each issue, we will now try to increase to at least two such articles. Last month we covered the Exatron disk interface for the Color Computer. We have just received the Radio Shack disk interface and are putting together an evaluation of it now. It looks good.

If you haven't noticed yet, our unclassified advertisements have become unclassified announcements. We are not charging for them anymore, but they are now limited to "one of a kind" items for sale and notices for clubs, requests for help or information and the like. Your announcement runs one time only, but you may resubmit as many times as you like. Look at it more like a club bulletin board if you will, and use it — it's an inexpensive way to move personal items. If you are a commercial operation, we suggest you use our "Micro-Mini" ads, they are also quite reasonable and in addition, will get you a reader service number.

Speaking of reader service, the number of responses has gone way up since we started using the postage paid card. It also lets us and our advertisers know a whole lot about interest in their products. Since we tabulate them here, we get a good look at the numbers of responses, and can tell a prospective advertiser pretty well in advance what kind of response to expect. What you get for circling that number is more information about that product you are interested in.

Authors will be pleased to know that our new Editor has installed a procedure whereby all articles are tracked and *actually getting out on time!* How about that? The four to six weeks we promised is now a reality! Incidentally, it sure helps when you send in a program, to send a tape or diskette with the program on it. We simply do not have the time to type in all program submissions.

We are calling this issue our "Word Processing" issue. It's not *all* that, but starts out with it on page 16. Lawrence Charters does a neat job with spelling checkers on page 23, and Jim Klaproth takes an in-depth look at Prosoft's Newscript on page 31.

When I saw Ralph White's Tic Tac Toe, my reaction was: "Not again!" But this one has a clever twist. It turns out to be an educational game, wherein you must first reduce a fraction or lose your turn!

Bill Barden, Jr. is back with a look at two books on early computing. It makes for very interesting background information, on page 72.

For beginners, this month Terry goes into arrays and how to handle them. It's on page 62.

When is double precision not double precision? Most of the time, according to James King. On page 87 he tells how to make them real.

There are reviews on various things in this issue. We have been short changing reviews lately and are trying to catch up. Some are short and sweet, some are long; we hope you like them.

One of the most unusual things about publishing is the lead time. Here it is, the middle of December and we are getting ready for Christmas parties and the like. The issue we are putting together right now is this one — February 1982. It should really be time to think about Valentines and all that, so I will simply pass along slightly belated seasons greetings for the *real* time, and hearts and flowers for the time you will be reading this.

Nice days *are* made, not had. See you all next month . . . **Mike**

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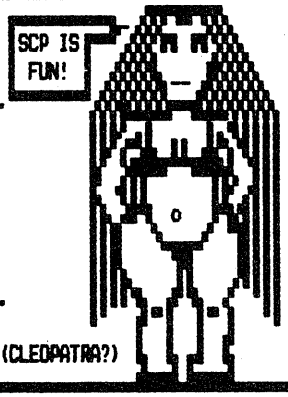

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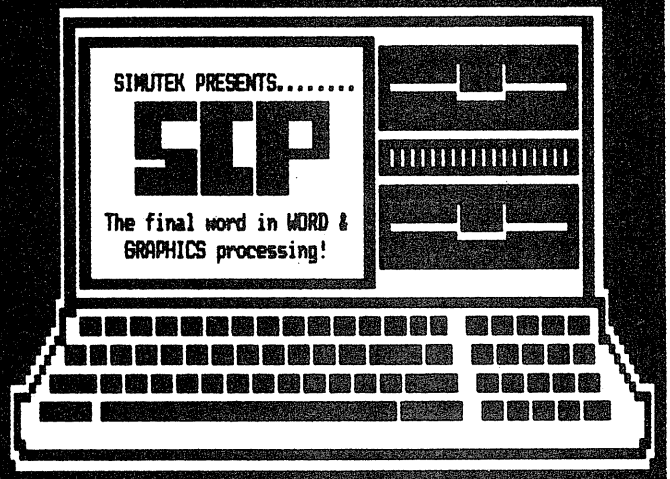

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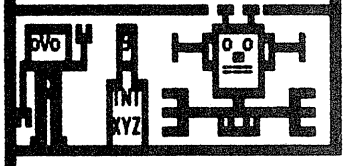

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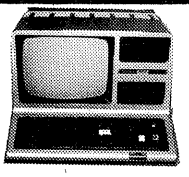

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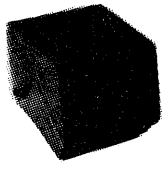

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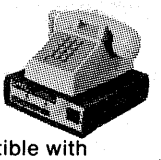

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Tandy Topics

Ed Juge, Director, Computer Merchandising, Tandy Corp.

1500 One Tandy Center, Fort Worth, TX 76102

There has been a suggestion that I editorialize a bit about the Model III. There have been conflicting stories about what it started out to be, would have been (if not for the FCC), etc. The question is a valid one, so...

The Tandy Center staff sometimes starts compiling a "next-version wish list" even before introducing the first version of a computer. The definition of a product is a joint effort between the Computer Merchandising and Research and Development departments (which includes hardware engineering, applications and systems software). There is considerable coordination with other departments including repair, support, parts, quality assurance and other critical functions. Of course, we receive guidance from the highest corporate levels.

In the case of the Model III, we had been gathering information and requests from the field on Model I changes... cure the LPRINT lockup, better keyboard, better monitor, get rid of the interconnecting wires, more disk space, etc. We were conceptualizing a new version at about the time it became apparent the FCC was going to get into the issue of radio frequency radiation limits. We didn't know then exactly what the outcome would be, or if they would relax or postpone the rulings. We (and some outside consultants) looked at the Model I and determined that no simple "modification" would make it meet the expected standards. Redesign was the only route to go, and of course a logical time to incorporate the most requested changes. Would the Model III have come along without the FCC? Yes. As quickly as it did? Pretty close. Would we have dropped the Model I? Very doubtful, or at least not until decreased demand dictated it.

Would Model III have been a 24 x 48 format? Absolutely not... the availability of the Model I software library to the Model III owner was too great an asset to give up. But why, then, weren't the computers directly compatible? Well, to fix some of the things we knew you wanted fixed, and meet our deadlines, it just wasn't possible. We had to use a little more memory, and change some things around. Most programs which followed "instruction book programming techniques" worked directly. Those including "imaginative" programming didn't. As it turned out, about 85% of our Model I software could be converted. Some packages needed minor patches the user could make. Some had to be completely re-issued for the Model III. We've completed our job of converting Model I business software to the Model III. New packages which work on both are now coming with a diskette for each, eliminating "conversions." New versions of our accounting packages have just been released on our latest TRSDOS. The delay was to fix all known problems in both the Model I and III versions. Painful, but scheduled to be completed between the time I'm writing this and the time you read it.

Finally, there has been a rumor that we "asked for the FCC ruling to keep down foreign competition". Absolutely ridiculous! The "offshore" folks can meet the rules as easily as anyone else. The rules cost us lots of Model I sales we could have continued to enjoy, and forced us to work a little faster on the Model III than we might have liked. They also cost us and everyone else in the industry a lot of time and money... and made the products cost you a little more.

ARCNET

I doubt there is a TRS-80 owner who hasn't heard about our joint announcement with Datapoint to create an "ARCNET" local network for Model II's, using their protocol and proprietary LSI (Large Scale Integration) chip. Target for availability is the end of the second quarter of calendar year 1982. ARCNET stands for "Attached Resource Computer NETwork". The system will consist of two main components: Applications Processors (work stations which run their own programs locally), and File Processor(s), dedicated to managing the Hard Disk files and requests made on them. A printer can also be attached to the File Processor for shared use, or of course, any individual Applications Processor can have it's own printer. Communications between the Applications Processor is only via the File Processor. Both Applications Processors and File Processors are Model II TRS-80s, with a board added containing the system

interface (expected to be roughly $400). In addition, there will be a central interconnect box which hooks everything together. Connection is via RG-62/U coaxial cable, and transfer rate is 2.5 million bits per second!

The minimum system will be one File Processor and two Application Processors connected through a lowcost passive (probably about $200) box, capable of adding one more processor. For more processors, a larger active interconnect box (about $2000) can connect eight processors (mixed), or seven processors and one port to connect to a second active box with seven more processors. The theoretical limit to the system is 255 total processors, but the practical limit will probably be around 150. (There will not be a limit on the number of File Processors in a system as there are in some other networking schemes.) An interesting characteristic of the system is that processors can be added or disconnected from the system without disturbing operations in progress.

Let me make it very clear that this joint venture does not mean that Model II's will be running Datapoint software or vice-versa. We will be able to pass ASCII files and requests back and forth between a Datapoint system and a Model II ARCNET, and a user will eventually be able to add a Datapoint File Processor with their 137 megabyte hard disk or 900 line per minute printer to his Model II ARCNET... or even link a Model II ARCNET to a Datapoint ARC network. Our Bisync communications packages will also permit linking a Model II ARCNET to certain other mainframes.

Our intention will be to support our more sophisticated software on ARCNET. We won't "spin up" such things as our current single-disk accounting packages. And, of course, existing Model II's can be easily adapted to work in an ARCNET system.

Advantages of ARCNET

Obviously, the advantages of ARCNET are several. A Model II owner will have an easy and affordable upward path for expansion that will result in more power than a minicomputer system of comparable cost. Multiple workstations will be able to share a common database. The redundancy of having multiple Model II's adds reliability. You could even put a hard drive controller in one of the system Application Processors, so if you have to pull the File Processor for service, you can move the hard disk to the other Model II, and keep going. Unlike Ethernet, ARCNET is based on a proven, reliable technique with more than four years of field operation, it is not sensitive to adding or removing processors during operation, and processors do not have to be attached at precise locations on the cable (and only at those locations).

Well, I've given you about all the information I know right now about ARCNET, so I will ask that you not call your local store, Customer Service, or me for more. There is no more yet. And with that... and since my copy deadline is going to give Federal Air a little more business this month, I'll see you in March! ■

Word processing

A look at currently available software

80-U.S. staff

A graduate student related an experience he had with one of his university professors. The professor felt a change was needed in the student's final thesis. To the professor's surprise, the thesis was ready the next day, again in final form, thanks to a word processor.

Word processing has become a high priority for many businesses and individuals, but selection of a suitable package can be a major task. The reason is that no single word processor or text editor does everything. Part of the problem lies with a misunderstanding of the terms *text editor* and *word processor*. To many, the two terms are synonymous — each is considered the equal of the other. This simply is not the case.

Text editors take many forms and all share one thing in common — they allow preparation and retention of text material. A good example of a text editor is the BASIC line editor. It is line oriented—only one line may be edited at a time. Changes, deletions and insertions may be easily made.

Text editors may be used to generate letters, articles or other kinds of text. Some of the text resembles program listings while others take on a very professional appearance. The latter are usually produced with the help of a program called a *formatter* which strips off the line numbers and leading remark keywords from the BASIC file. Other text editors provide a wide range of capabilities for on-screen modification of text.

Word processors are more than text editors. They include sophisticated printing capabilities and special printer functions such as bold face or overstriking, sub- and super-scripted text, underlining and character size and font selection, depending upon the printer being used. This additional capacity for printer control turns the ordinary text editor into a complete system: the word processor.

Recently, additional abilities have been added to word processing. These include spelling checkers, hyphenation dictionaries, grammar checkers, the manipulation of complete columns of numbers, the ability for a single page to serve as both header and footer (boiler plating), full support of justification for printers with proportional spacing capabilities and calculation of columnar figures.

We looked at four word processing systems applicable to the Model II: Scripsit, Magic Wand, Wordmagic II and Vedit. Each is a full word processing system, screen oriented for ease of operation and all four represent some of the best available.

Scripsit

Radio Shack's entry, Scripsit 2.0, is perhaps the best investment in word processors if sophistication and optional features are important considerations. This version should not be confused with the Model I package.

The Model I/III version is a screen oriented text editor with the capability of embedding special printer commands in the text. A screen oriented text editor allows movement of the cursor through the text to make changes where needed. The Model I/III version is very complex but lacks in a number of features: text size is limited to memory size. Specialized printer functions for

underlining, sub- and superscripting and size-font changes are not supported. Also, merging text with data files is not allowed. Auxiliary programs are available which add some of these capabilities. Probably the most popular is Superscript from Acorn Software.

Scripsit for the Model II is also screen oriented. The text is page oriented; that is, the text resides on disk in blocks called *pages* which are brought into memory for editing purposes.

Full control over width and number of lines per page is provided up to the limits of the format selected. Excess lines entered beyond these limits are automatically transferred to a new page as required. While this is generally inapparent to the user, the system will hang up and wait for creation of additional pages when new material is being inserted into existing text.

Here, the expansion must be done manually. The process is simple: while pressing and holding the control key, press the "G" key and enter the new page number as a decimal fraction of the original page (i.e., 2.1, 2.2 or 2.3). After completion of the operation, the pages may be renumbered in the normal integer fashion.

Additional features include global search and/or replace, repagination, reformatting, renumbering of pages, hyphenation (manual), justification, block definition and manipulation, text merging and assembly.

Scripsit does have a few shortcomings. One is its size. Many of the functions are called from disk as an overlay. This tends to slow down the response of the system. Fortunately, type-ahead allows the knowledgeable operator to overcome this problem, making it hardly noticeable.

A recent release, version 2.0, includes features previously not available on the original version 1.0. One of these is the inability to call a non-Scripsit file into Scripsit for editing and then write it out again. This may now be done with any ASCII file, including BASIC programs saved in this format. However, two drives are required or a sub-sized Scripsit disk must be created to make room for additional files on a single drive system.

Version 2.0 also has the ability to work with files created by Profile II, Profile II+ and the Mailing List II programs. In addition, the powerful Scripsit Spelling and Hyphenation Dictionary program is accessible. All of these require a minimum of two disk drives. Also planned for Scripsit as programs or extensions: column manipulation, boiler plating for multiple documents and full support of justification for printers with proportional spacing capabilities.

Version 2.0 is available as an update to current owners for $100.00 or new for $399.00 through Radio Shack stores. Company computer centers and computer departments stock this item. Areas of improvement include speed and type-ahead, automatic printing from one file while editing another and easier function key and control-key programming.

"Word processors are more than text editors. They include sophisticated printing capabilities and special printer functions. . .

Scripsit has always had excellent documentation. Now included is a small (3¾"x6") pocket reference book. Training cassettes are included which assume *no* prior computer knowledge and are easily understood.

Perhaps the most powerful Scripsit features have nothing to do with text preparation or printing. They are the built-in operator prompts and HELP command. These features, along with numerous full-screen menus, make this software package easy to use.

Wordmagic II

Wordmagic II is a complete, easy-to-use, page-oriented word processor, designed to run on the TRSDOS operating system. It contains all of the most wanted features: global search and replace, insertion, deletion and overwrite. Wordmagic II is priced lower than Scripsit and proves to be a real bargain.

Editing a file is easy. Designate the file desired and a destination file for completed text. Pages of text are then edited one at a time. Files may be distributed on different disks when used on multiple drive systems. Text size is only limited by the amount of disk storage capacity; over 400,000 characters (80,000 words).

Wordmagic II can automatically generate a table of contents, create form letters and prepare mailing lists. It can easily combine files but cannot edit BASIC programs because control information is embedded in the text.

Insertion of information into existing tables is troublesome. Wordmagic II insists on closing everything up and reformatting after each new entry. Insertion into existing text creates another problem: new pages must be created for excessive text. These shortcomings are minor and should cause few problems to the average user.

Wordmagic is a combination of BASIC and machine language software. It is well designed as evidenced by the impressive screen performance.

Magic Wand

Magic Wand runs under the CP/M disk operating system and is very easy to use. It is not page oriented. Instead, an entire text file is loaded into memory for editing. This method allows for large text files, but size is restricted by available memory. The advantage to this method is that the *entire* file may be viewed in context while scrolling. This is important for continuity in certain applications.

Upon entering the editor mode, options are selected for line length, block text processing, merging and selection of program or text mode. The editor may be used for program editing or word processing duties. These features are a welcome plus for CP/M users.

Text printing is controlled in a manner similar to Model I Scripsit: control information is embedded in the text. Unlike the Model I, Magic Wand allows keyboard override of the embedded formatting commands. Some of the keyboard commands may be a bit confusing at first, i.e., to delete a character, press the HOLD key; to insert a character, press CONTROL-V, to insert a line, press CONTROL-O.

Magic Wand can also generate form letters. It supports conditional logic (if . . . then) in command lines, sub- and super-scripts, underlining and bold face (overstriking).

The excellent reference card allows almost instant access to the system for the first-timer. It is a well-designed system.

The CP/M operating system creates a problem with print and page formatting—the carriage return and line feed functions are combined and sent as a single character under TRSDOS but not under CP/M. As a result, Magic Wand consistently provides a line feed for each carriage return sent to the printer. Some CP/M systems can filter this out, but it's easier to handle at the printer if there is a switch to disable the automatic line feed on carriage return.

Vedit

Vedit is the least expensive of the systems examined for the Model II. Vedit is a text editor with a plus: it is fully user programmable into a custom word processor or program text editor. The customization process is self-prompting and a complete list of suggested assignments is included with the Model II package.

Vedit is not a true page oriented system, nor is it memory oriented. Instead, it uses a text buffer for editing purposes. Lines are moved between the buffer and disk (one at a time) so rapidly that the entire text appears to reside in memory.

Full editing functions are supported. Search and replace, file handling, block text handling and character functions are available.

Vedit is actually two editors in one. For most text entry and normal corrections, there is the usual screen oriented mode. The other mode allows multiple replacement commands—even the ability to create new commands from old ones. These features allow major changes in text to be handled by a single command line or by development of "macro" instructions. These allow complex editing tasks to be carried out with single commands.

Comment

Part of this review involved asking a word processing specialist to give us her opinions. She compared these packages to dedicated word processing systems: Wang, A-M Varityper AMtext and DEC WS200.

Her first response concerned limitations of the Model II packages in comparison to the dedicated systems. One area of concern was the lack of form designs and manipulation. Professional systems also include sort packages, arithmetic capabilities, automatic pagination, automatic hyphenation and very flexible document merge capabilities. The specialist found many systems lacking in these areas.

Magic Wand has limited arithmetic capability and, like Scripsit 2.0, automatic pagination. Sorting and forms design are missing completely. Hyphenation is something the operator must do in advance. Despite these criticisms, the expert found that no word processing task required a capability not present in the systems tested. That kind of performance should be sufficient for most needs.

Update

Since these tests were concluded, Radio Shack has introduced new software for Scripsit. Now the system's flexibility approaches those of professional, dedicated systems. Profile II and Profile II+ packages allow forms design and many arithmetic functions. Mailing List II now merges with Scripsit for good control of specialized personal letters. The Scripsit Spelling and Hyphenation Dictionary provides automatic hyphenation and a spelling checker of over 100,000 words. ■

Scripsit, Radio Shack, Model I/III, 26-1505, $39.95 (tape only; Model I/III, 26-1563, $99.95 (disk only); Model II version 1.0, 26-4530, $299.95 (being discontinued); Model II version 2.0, 26-4531, $399.95.

Wordmagic II, Data Strategies, Inc., P.O. Box 28726, San Diego, CA 92128, (714) 489-9218, $195.00.

Magic Wand, Peachtree Software, Inc., 3 Corporate Square, Suite 700, Atlanta, GA 30329, (404) 325-8533; price varies from dealer to dealer. Contact Peachtree for dealer nearest your location.

Vedit, CompuView Products, Inc., 1531 Jones Dr., Ann Arbor, MI 48105, (313) 996-1299, $130.00.

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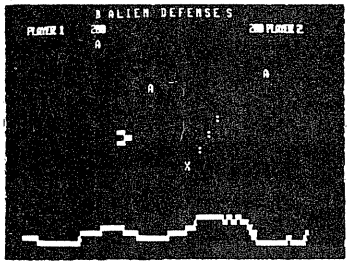

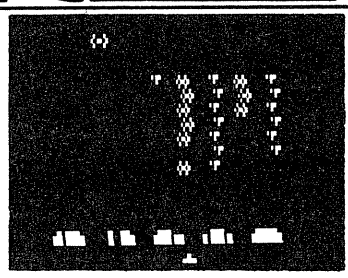

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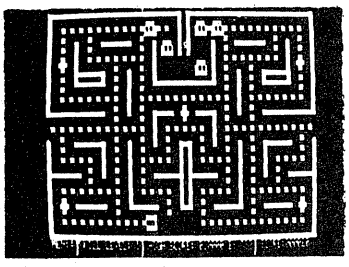

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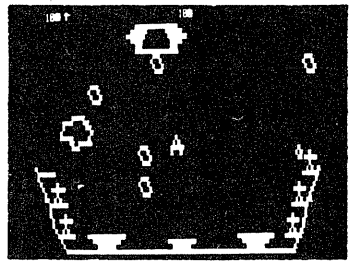

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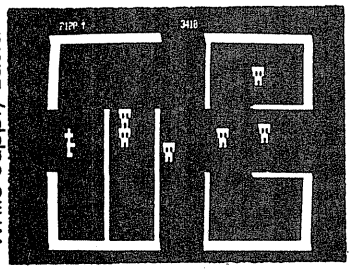

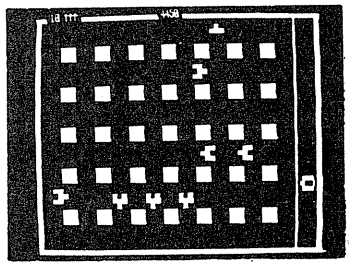

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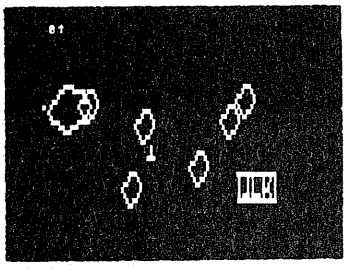

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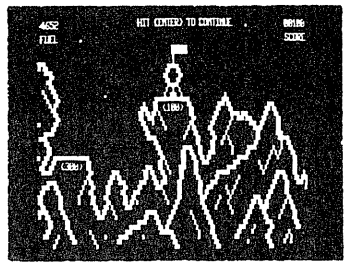

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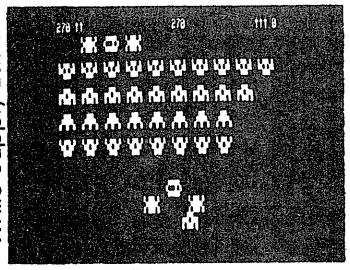

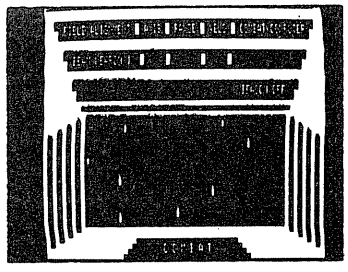

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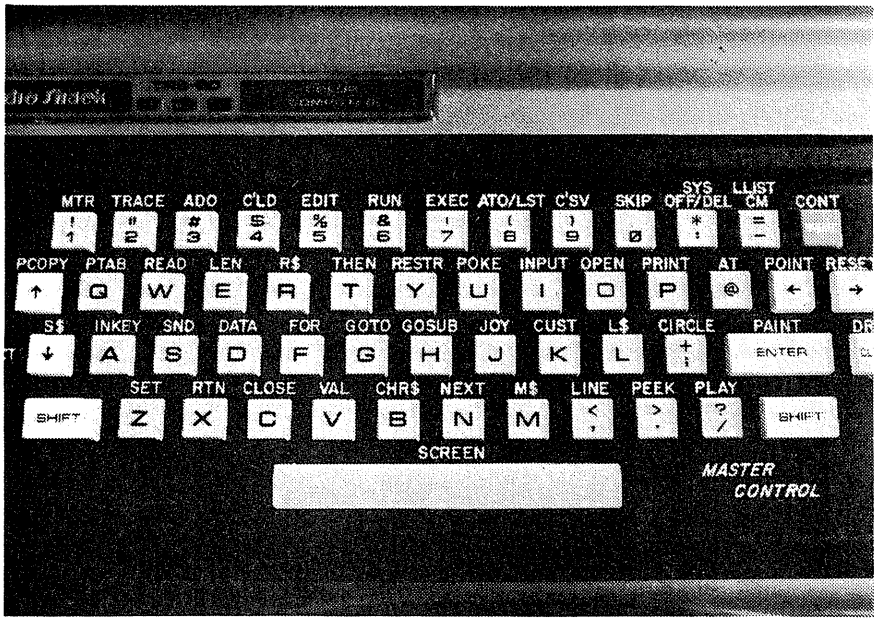

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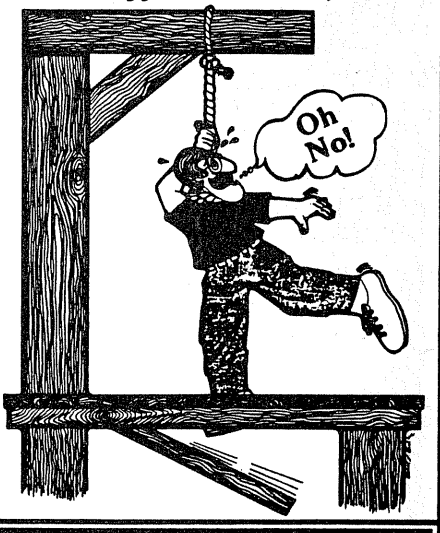

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*TRS-80 is a product of Radio Shack, div. of the Tandy Corp.

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13. Files are compatible with TRSDOS

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14. OTHERWISE clause on case statements
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18. Characters within strings may be specified by ascii code. Allows non-printable characters in strings.
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42. Files are compatible with TRSDOS
43. Can also edit text and BASIC programs
44. Many additional features

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    - •Allows large programs in small memory space (8500 line + programs can execute in 48k)
46. Native code for speed
    - •Optional code generator produces Z80 instructions
    - •Z80 code can be mixed with Pcode

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IBM is a trademark of International Business Machines
Z89 is a trademark of Zenith data systems

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47. Links separately compiled routines
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250 Page Documentation Package

50. Beginner's guide
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52. Pascal Reference Manual
53. System Implementation Manual
54. Text Editor Manual
55. Handy System Reference Card
56. Cross reference index for documentation package

Optional Advanced Development Package

57. Pcode optimizer
    - •Reduces the size of a program by 25-30%
    - •Increases execution speed
58. Z80 native code generator
    - •Produces relocatable, reentrant native code for the Z80
    - •Native code executes 3-5 times faster than Pcode.
    - •Native code can be mixed with Pcode to provide speed where required and still benefit from the compactness of Pcode

Hardware Required

TRS-80 model I; TRS-80 model III; or CP/M system (with Z80)
48k of memory
One disk drive (two recommended)

TRS-80 version compatible with TRSDOS and most other operating systems.

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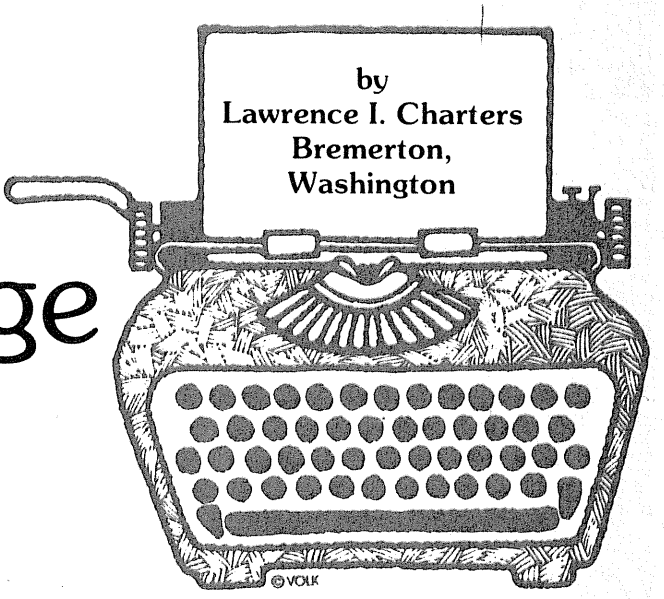

The advertisement says, "Throw It Away (your dictionary, that is)," and implies that bad spelling is a thing of the past— once you have a computer dictionary. While this is a great ad, it isn't quite accurate. A spelling checker should definitely improve your spelling, but you'll still need your trusty paperback version. Spelling checkers are *huge,* complex, expensive programs; even so, they are not masters of English.

Spelling checkers are thorough. A good spelling program will find errors that even the pickiest English teacher may fail to see. Spelling dictionaries may not seem particularly exciting, but you may be surprised.

Some History

When the term "word processing" first came into vogue, most people didn't have the slightest idea what it meant. The concept of a "processed word" implies that there must also be "unprocessed" or "raw" words and did anyone really want to know what they were? (Some things are best left unknown . . .) Then, along came personal computers, text editors, Electric Pencil and Scripsit. Suddenly, a "word processor" was revealed as something very useful and desirable: a magic typewriter. Pencils, pens, typewriters and correcting fluid became obsolete. Even the worst typist could churn out letter-perfect copy given a computer, decent software and a printer. Well, almost. . .

When IBM introduced their Displaywriter word processor not too long ago, one feature came in for special attention: the Displaywriter had a built-in 50,000 word dictionary. After a document was finished, Displaywriter's dictionary (on diskette) would check every word in the document and all "unknown" words were highlighted in reverse video. The writer could then go back through the document and see if the highlighted words were typographical errors, misspellings, or simply words or names the dictionary didn't recognize. The Displaywriter, at $8,000, was an instant hit and the dictionary was no small part of this success.

After seeing the Displaywriter in action, many observers wondered, "But what if you don't have $8,000 and are a rotten speller? Is there hope?" Despair not. Anything IBM can do, a TRS-80 can probably do, and cheaper, too.

Three Different Approaches

For this evaluation, we examined three spelling checkers which are available for the TRS-80. The least expensive, Proofreader, from Aspen Software (formerly Soft-Tools), will scan a disk document file of any length, keep track of all unique words and display the number of unique words found. These words are then sorted and compared to Proofreader's dictionary of 38,000 words and any suspect words are listed to the screen, one per line. If desired, Proofreader will write this list to a disk file, which can then be printed by a printer. Proofreader does not have any provision for correcting the document; you must use your word processor, text editor, or Proof-edit (also from Aspen) to go back and manually search out and correct any misspellings or typographical errors. Proofreader comes on three diskettes and requires 32K and one disk drive.

Slightly more expensive and very different in approach, is Hexspell, from Hexagon Systems. Hexspell will scan a disk document file of any length, scrolling the document up the screen as it does so and compares the text against its 29,000 word dictionary. When Hexspell comes across something it doesn't recognize, it shows the word in context and asks if it should leave the word as is, add the word to Hexspell's dictionary, or replace the word. If you choose to replace the word, Hexspell asks you to type in your correction. While Hexspell is active, it maintains its own separate copy of your document and when finished, automatically copies this corrected version back to your original file. Hexspell also provides a total word count for the document and notes the number of words which it did not recognize. Hexspell comes on two diskettes and requires a 48K, two-drive system.

Perhaps the best known (and most expensive) system is Microproof, from Cornucopia Software. It is available in a number of configurations including a version which will handle any size document. The version we received handled documents up to about 4,000 words, the limit imposed by the TR$-80's memory. In its basic form, Microproof first scans the document, then checks it against its 50,000 word dictionary. Suspect words are listed on the screen or,

optionally, printed by a printer. You must then use your word processor or text editor to find and correct all misspellings.

With the optional correcting ($60) and word processing integration features ($35), Microproof operation is greatly simplified. From Scripsit, Electric Pencil and other popular word processors, you can directly call Microproof, which automatically scans whatever document you are working. Suspect words are then listed on the screen, one at a time, and you are asked if you wish to leave them as is, replace them, or add them to Microproof's dictionary.

Microproof will, after initial corrections are made, display in context only those words specifically requested. Obvious misspellings, such as "sincereley" for "sincerely", can be handled quickly and puzzling terms (is "IL" a misspelling of "ill" or an abbreviation for "Illinois?") can be given greater attention. Once the document has been corrected, Microproof reloads the word processor and the corrected document. Microproof comes on one double-sided "flippy" diskette and requires 32K and one disk drive.

Though not mentioned in Cornucopia's advertising, a two-drive system (or operating system allowing single-drive file copying) is required for setup.

The Details

All three spelling checkers were tested on a 48K, two-drive (35-track) TRS-80 Model I, with Radio Shack's lower case modification, memory, drives, etc., using TRSDOS and Apparat's NEWDOS/80 version 1.0. The only non-standard hardware was Percom's Doubler II, used with double-density NEWDOS/80 2.0. Sample text files for testing were prepared with standard Scripsit and Scripsit modified with Acorn Software's Superscript.

Proofreader

Aspen Software's Proofreader performed rapidly and consistently. The main program, PROOFRDR/CMD, is loaded first, then the file to be checked. Once Proofreader has sorted all unique words in the document file, the two dictionary disks, DICT1/BIN and DICT2/BIN, are loaded one at a time into any drive (a system disk is not required). Both dictionaries are around 69,000 bytes long and Proofreader scans them in alphabetic order according to length. In fact, if a document consists of nothing but short words, Proofreader won't bother to prompt for DICT2/BIN. If desired, an optional dictionary AUXDICT/TXT, is checked. As a final step, Proofreader prompts for a system diskette to be loaded in drive 0 and will then save the suspect word list to disk if desired. The only apparent way to "crash" Proofreader is to ignore this prompt—all other steps are carefully checked by the program. If you do crash the program, no harm is done since Proofreader does not modify the original document file. All necessary instructions are carefully presented in the eight page unindexed manual.

Proofreader does not distinguish between upper and lower case, does not check anything beginning with something other than a letter and does not check single-letter words. When the list of suspect words is displayed on the screen, it is in upper case only and if printed on a printer, appears all in lower case. Proofreader also makes broad assumptions about words ending in "s", which occasionally creates problems with plurals and words that Proofreader thinks might be plurals. When the suspect word list is printed on a printer, line feeds are inserted after every word. This consumes massive amounts of paper if you are a rotten speller. If your paper budget is getting low, these line feeds can be removed by first loading the list into Scripsit and then replacing them with blanks.

Since Proofreader lacks a correcting feature, you must edit your document with your word processor, guided by the list of suspect words. AUXDICT/TXT is used to load the entire file into your word processor and make whatever changes are desired. This limits the size of the dictionary to whatever the maximum document size is for your word processor, unless you are skilled enough to write a sequential access program specifically tailored to the task. There is no way to edit the main dictionaries; fortunately, they do appear to be accurate. Aspen's Proof-Edit package, available separately, allows editing of all Proofreader dictionaries.

Testing Proofreader under both single- and double-density operating systems revealed no obvious weaknesses.

Hexspell

Hexspell was written with the Microsoft BASIC compiler and this gives it a very different flavor. To run Hexspell, you type "BRUN SP", which loads the Microsoft BASIC run time package (BRUN/CMD) and Hexspell's chaining program (SP/CHN). Hexspell prompts for the dictionary disk to be mounted and then for the file to be checked. The document file is scrolled up the screen while you proofread the document. Since the entire document is displayed, in proper upper/lower case (you must use your own lower case driver), proofreading is unbelievably simple. When Hexspell finds a suspect word, all you need to do is type "L" for Hexspell to learn the word, "S" to skip the word (leave it as is), or "R" to replace the word.

Hexspell will check the spelling of replacement words as well as words in the original document. In other words, if Hexspell complains about "misstake" and you replace it with "misteak", Hexspell will flag it again. Though seemingly a trivial item, this feature sets Hexspell apart from the other two spelling checkers—Hexspell checks *everything*. Hexspell ignores all characters but letters, will check single letters and treats upper and lower case identically. A nice feature for writers and anyone else interested in word counts is Hexspell's summary count of total number of words in a document, together with total number of unrecognized words. As numbers are ignored, "1982" would not be counted as a word (though editors would count it). On the other hand, "M60A1", the designation of a type of U.S. tank, would appear to Hexspell as "M A", and count as *two* words.

Hexspell has two dictionaries, one which remains in memory (SPELL/MEM, about 17,500 bytes or 6,000 words long), and one which remains on disk (SPELL/LST, about 70,000 bytes, or 23,000 words long). The in-memory dictionary contains commonly used words, which greatly speeds Hexspell's operation. After each proofreading session, Hexspell automatically adds any words you asked it to learn to

SPELL/MEM, and bumps infrequently used words onto SPELL/LST. SPELL/LST, in turn, "forgets" unused words to make space. After a while, this ripple effect tailors Hexspell to your personal vocabulary. With use, Hexspell becomes so familiar with your vocabulary that it seldom needs to consult the disk-based dictionary.

Hexspell can, at your request, ignore all words that begin with a capital letter. This option avoids checking of proper names and terms and speeds the proofreading process. (Hexagon also recommends it as a check for lower case letters in BASIC programs.) Another unusual feature is a BASIC program which clears the entire dictionary. If you wish to teach Hexspell a foreign language or a specialized vocabulary, running CLEAR/BAS will "zero" the dictionary and allow you to start from scratch. Using this feature, a 140,000 byte science fiction book catalog (containing 1800 titles) was fed to Hexspell. When finished, Hexspell recognized Isaac Asimov and Roger Zelazny to be good people and had no trouble with androids, quarks, wizards, stainless steel rats, ringworlds, white dragons and other essentials.

If Hexspell has any faults, it is in error handling—all traceable to Microsoft's BASIC Compiler. Microsoft spared no expense on error trapping—they didn't spend a dime. As a result, Hexspell displays great consistency when it comes to errors: it crashes. Fortunately, there aren't that many ways to generate errors and none will damage your original document. If you try to check a non-existent file, Microsoft's BASIC run time package (BRUN/CMD) will respond with:

Error. File not found at 5C43.

This cryptic message can be easily avoided by giving Hexspell correct file names.

Hexspell works well under TRSDOS, NEWDOS/80 and LDOS. Under a double-density system like NEWDOS/80 2.0, you can fit Scripsit, all necessary system files and all Hexspell files on one 35-track double-density disk. Hexspell comes with a well-written spiral bound manual containing 10 pages of instructions and a good table of contents. A sample text file (on diskette) is also included to illustrate Hexspell operation.

Microproof

Cornucopia Software's Microproof is the fastest spelling checker of the bunch. Without use of the optional correcting and word processing integration features, Microproof operates much the same as Proofreader: text files are scanned, the contents compared to Microproof's dictionary and any suspect words are then listed on the screen. If desired, these suspect words can be printed on a printer. Unlike Proofreader, no provision is made for saving the list to a disk file.

Microproof's three dictionaries—DICT1, DICT2 and DICT3—contain an entire Webster's pocket dictionary of 50,000 words, yet take up just 56 grans (70,000 bytes) on diskette. This minor miracle is made possible by "coding and two sophisticated packing techniques."

Words are identified as verbs, nouns, adverbs or adjectives. By coding "fast" in the dictionary as an adjective, Microproof will recognize "fast", "faster", "fastest", "fasten", "fasting", and "fasted". Microproof will recognize certain prefixes, too, which means that you may slip an occasional "irregardless" or "inclosed" past it without trouble.

These inconsistencies and others are discussed in the 30-page manual: "In some instances, a correctly spelled word that is actually in Microproof's vocabulary will appear on the error list. This can happen when the correct word is located alphabetically close to another word which appears on the error list and actually is incorrect." If this type of thing bothers you, Cornucopia offers a "literal" dictionary which avoids this problem at the expense of speed.

Adding words to Microproof is fairly simple: just create a file

Criteria

	Hexspell	Full Micro.	Proof.
Ease of Use	excellent	excellent	fair
Performance	excellent	excellent	good
Documentation	good	excellent	good
Error Handling	poor	fair	excellent
Accuracy	excellent	good	excellent
Speed*	good	excellent	excellent
Personal Opinion	great	good	good

**Speed is subjective. With a lot of errors, Hexspell is slowest due to constant disk access. Microproof is clearly the fastest and Proofreader comes in between the two under these conditions. With no errors and most of the vocabulary in memory, Hexspell equals Proofreader's speed.*

Features

	Hexspell	Micro.	Proof.
Words included	23,000	50,000	38,000
Potential total words	29,000	unlimited	45,000?
Auto correcting	yes	ex. cost	no
Auto expansion	yes	ex. cost	no
Manual correct	no	yes	yes
Manual expansion	no	yes	yes
Define word type	no	yes	no
Create special dictionary	option	no	no
List words to printer	no	yes	yes
List words to screen	yes	yes	yes
Show word in context	yes	ex. cost	no
Ignore non-letters	yes	yes	yes
Ignore single letters	no	yes	yes
Ignore upper case	option	no	no
Call from word processor	no	ex. cost	no
Counts total words	yes	no	no
Counts unique words	no	no	yes
Edit dictionary	yes	partial	partial

containing the words you wish to add and ADDTODIC/CMD will make this part of DICT3. PRINTDIC/CMD will allow you to edit and delete words from the expansion dictionary.

Microproof treats upper and lower case letters the same, does not check single letter words and ignores all non-letter characters. All words appear on the screen in upper case only and if printed on a printer, words appear in lower case.

According to Cornucopia's advertising and documentation, Microproof has no trouble with hyphens, but this isn't exactly true. Microproof cannot handle compound words which use hyphens, such as "TRS-80", "double-sided" and "fool-proof". Cornucopia stated: ". . . we chose to reject word configurations like very-nice or not-too-greasy. Thus, a pair of proper words will be accepted with a hyphen between them only if they are found in Microproof's dictionary in hyphenated form. The user may, of course, add them himself as we did with "soft-sector" in the enclosed test file. End of line hyphenation is, of course, ignored and the two halves of the word are treated together as one word."

The fully integrated version of Microproof (using the optional word processing conversion and correcting options) is exceptionally powerful. When ordering the software, you must clearly state the model of your machine and (for the integration feature) the word processing software package you are going to use.

Non-technical types will appreciate the integrated version's ease of use. While Hexspell and Proofreader (and standard Microproof) are called from DOS, the full-blown Microproof is available directly from inside the word processor. After writing your document, type "M" on the command line and Microproof will automatically load, scan your program, prompt for the dictionary diskettes, guide you through the correcting phase and reload your word processor and corrected document. From your point of view, it appears that you never left your word processor!

During the correction phase, typing a "+", "?", or "!" will, respectively, add the suspect word to the dictionary, show it in context, or abort the proofing process. The use of single keys speeds proofing and the use of shift keys adds some measure of protection against errors. Pushing the Enter key will leave the word as is and corrections are entered by simply typing in replacement words. All corrections are global. In one test, typing "Orchestra" replaced all 543 occurrences of "Adams" in the document. This is an unexpected plus because Scripsit, in comparison, could not have handled as many changes—just 255 global replacements are allowed—and would have taken much longer as well.

Microproof documentation is outstanding. The manual is thirty pages long and includes a table of contents. Though a wide variety of word processors, machines and operating systems are mentioned in the manual, the writing is quite clear. A complete step-by-step programmed learning course, using a sample text file (included on diskette), is provided. Using NEWDOS/80 2.0 in double density, you can put Scripsit and all Microproof files on one double density diskette with room left over.

Recommendations and Considerations

There are some things that even the best automatic spelling dictionary cannot cope with. Consider the following two sentences:

Wants ponder dime, dare worst aye ladle gull culled Ladle Rat Rotten Hut.

Defeat other folks when other defense abhor detail.

Though they contain no misspelled words, both sentences make no sense unless they are said aloud, in which case you get:

Once upon a time, there was a little girl called Little Red Riding Hood.

The feet of the fox went over the fence before the tail.

This little demonstration might be summarized as: spelling isn't everything.

In terms of recommendations, Cornucopia's Microproof (the full version) would be ideal in a business environment. It is the fastest of the bunch and the ability to call it directly from and return to the word processor is a definite plus if it will be used by non-technical personnel. Cornucopia seems firmly committed to product improvement and their customer service is quite good.

If you have a one-drive system and a limited budget, Aspen's Proofreader is an appropriate investment. It is simple, fast and accurate. Though it lacks any provision for editing the document being scanned, Aspen has released two programs (currently being evaluated) which will overcome this limitation. Proof-Edit ($30 Model I/III) will allow interactive corrections, much like Microproof. Grammatik ($49 Model I, $59 Model III) will check for grammar and punctuation errors and produce word frequency counts—just the thing for writers!

As far as personal preference is concerned, Hexspell is the local favorite. Though available only for Model I (as of this writing—mid October) and requiring 48K and two drives, it is a bargain at $69.00. Hexagon had problems with delivery for a few months (thanks to Canada's mail strike), yet went out of their way to accept telephone orders, questions, complaints and general conversation. Using Hexspell, there is a feeling of control and control is essential in proofreading.

Final Comment

All these programs will check spelling, but none can act without human judgment. You still need a book-type spelling dictionary to look up the words flagged by the programs. Highly recommended is *Webster's New World Speller/Divider,* William Collins, publisher, $2.95. Unlike a regular dictionary, it contains nothing but words—no illustrations or definitions to slow you down. It lists 33,000 words, spelled and syllabified, and has a tough plastic cover. It works without a computer or even electricity . . . ■

Proofreader, Aspen Software, P.O. Box 339, Tijeras, NM 87059, (505) 281-1634, $54 (Model I), $64 (Model III), $109 (Model II).

Hexspell, Hexagon Systems, P.O. Box 397, Station A, Vancouver, BC V6C 2N2, (604) 682-7646, $69 (Model I).

Microproof, Cornucopia Software, P.O. Box 5023, Walnut Creek, CA 94596, (415) 524-8098, $89.50 (Model I/III), $149.50 (Model II), $60.00 (correction option), $35.00 (integration option).

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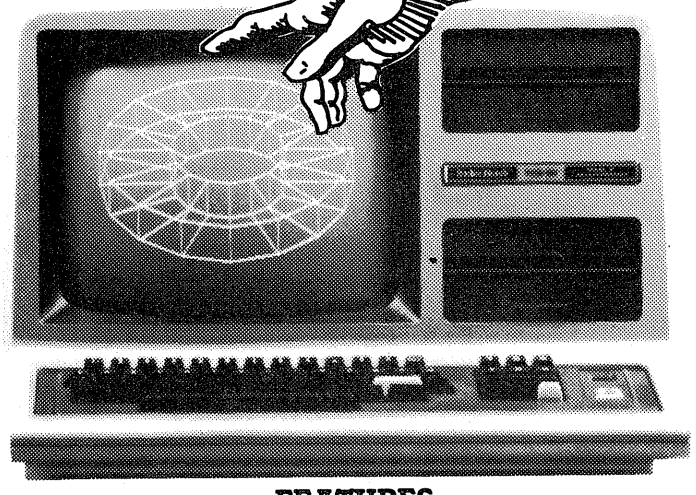

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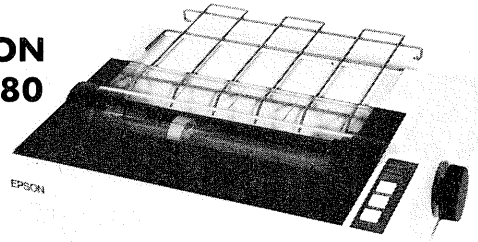

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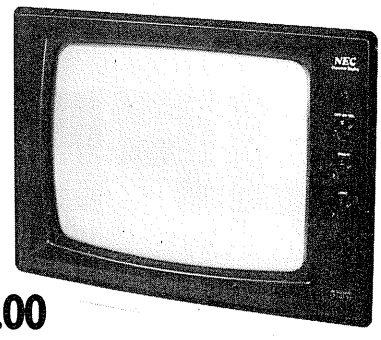

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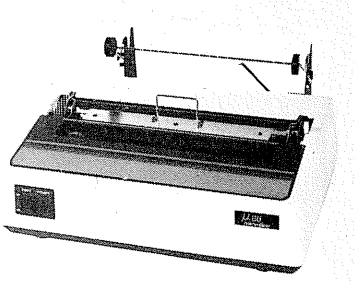

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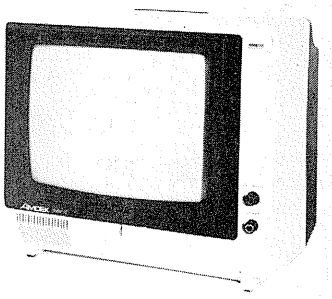

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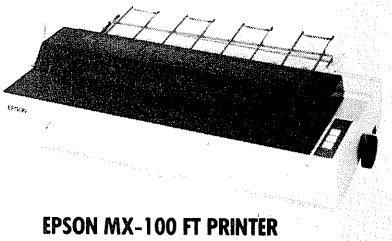

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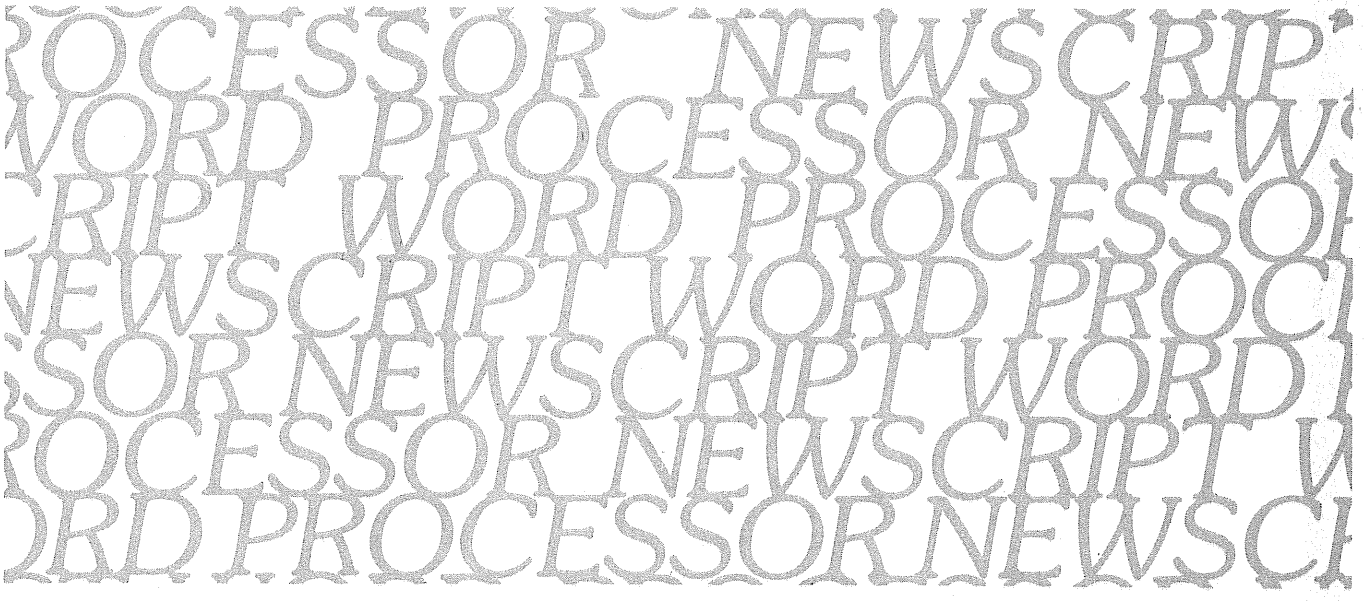
Newscript word processor

For Models I and III

Jim Klaproth, associate editor



There is a new word processor on the market that will change the way people think about the capabilities of the TRS-80. Imagine a powerful mainframe text editor running on a TRS-80, with virtual compatibility between the two versions. Imagine total support for all popular TRS80 printers, with total compatibility with all operating systems. Imagine a word processing system with automatic mailing list text insertion built right in. Imagine on-going support second to none, with superb documentation. Imagine a disk-based product that comes ready to run with a fast, efficient operating system. All this, and more, for only $99.95 for either Model I or III. What a fantastic bargain!

Newscript is the creation of Chuck Tesler, a former programmer for IBM, who was bitten by the microbug a few years back. He decided he would write a TRS-80 version of the IBM Edgar text editor and print formatter in order to maximize his word processing efficiency. He has done a magnificent job with Newscript, which evolved from an earlier attempt called Subscript. Chuck confessed that Newscript is his full-time project now, and that as new printers are introduced, support will be forthcoming.

Newscript supports right justification in the proportional spacing mode on the Line Printer IV, Centronics 737 and 739, Line Printer VIII and the Daisy Wheel II. Most word processors insert spaces between words, giving the text an uneven appearance. With Newscript, spaces are inserted uniformly between characters and words, giving the text a typeset look. Newscript also supports all of the features of the Epson MX-80 and MX-100, the Anadex 9500 series, the Microline 80 series, the IBM Selectric and all of the features of the current crop of Daisy Wheel printers, except proportional right justification. It will even do underlining on the MX-80, even though this is not documented in the printer manual, and italics with the Graftrax option.

Newscript is a very powerful system, with features found in few other packages in this price range. As one who cut his teeth on Scripsit, I must say that Newscript may be a bit more difficult to learn; however, once learned, it is just as easy to use as any other. The documentation consists of a nicely packaged looseleaf binder packed with 160 pages of user instructions and a quick reference card. The entire manual was produced using Newscript and printed on a Line Printer IV, interspersed with some excellent lithographic illustrations. It has a professional typset look about it and truly shows off the capabilities of the Line Printer IV. It is not meant to be read from cover to cover, but as a reference manual, with the easier material covered first. Once the user becomes familiar with the basic commands, the more complex features are presented. Examples are given for each command and a sample letter is provided on the disk for experimentation. There is even a "how to" section for quick reference to a specific need.

The disk contains a minimum DOSPLUS operating system and can be used "as is" or the files can be transferred to any current DOS in production. The main programs are called "EDIT", which is for editing, and "SCRIPT", the print formatter. The author chose to separate them to keep the memory overhead small and to allow more features to be included. It is a simple matter to transfer back and forth between EDIT and SCRIPT, and the current file name is automatically passed to the next program for smooth operation. According to the author, about one-third of Newscript is written in BASIC. Yes, BASIC! Before you start thinking that this is a slow program, let me assure you that it is anything but slow. In fact, as far as text entry is concerned, it beats Scripsit hands down. It will actually handle up to 750 keystrokes per second. It has never dropped one character for me.

Newscript actually is a combination of machine code and BASIC, with about 4500 bytes of code residing in high memory. The Level II keyboard routines are completely bypassed and a machine language program handles the input. It has a 128 character typeahead buffer, so that you may continue to type while disk access or string compression is taking place. It has a repeating keyboard, a lower case driver, a screen print routine and a detector to indicate when BASIC string compression is taking place. This is indicated by a large graphic "C" in the upper right corner of the screen. There is also direct keyboard input of special characters and graphics, and other utilities that automatically load during initialization.

The editor is a full-screen type, displaying 15 lines of text and a command line at the top. A maximum of 60 characters per line is displayed on the screen, with automatic wrap-around when the line length exceeds 60. There is an option to produce lines up to 255 characters in length by moving the 60 character viewing window back and forth. This is helpful when constructing wide tables or spread sheets. There is also a small margin on the left of each line called the LIMA (Line Manipulation Area), which allows several useful functions. Lines can be inserted, deleted, duplicated or marked for block moves by issuing certain commands in the LIMA.

For example, paragraphs can be exchanged by simply marking them in the LIMA and then moving the blocks, similar to the block move routine in Scripsit. There are powerful global find and change commands that are similar to Scripsit, but they give the user more flexibility. There is scrolling by line or by page, with instant return to either the top or bottom of the document. One really nice feature automatically saves the text after a specified number of lines have been input to prevent a power failure from wiping out an entire day's work because it was never saved. Other neat features are a directory function, a shorthand for certain common commands, the ability to kill a disk file while in EDIT, the ability to merge other files with the existing one and the ability to imbed ASCII printer control codes within the text.

"Newscript is the creation of Chuck Tesler, a former programmer for IBM, who was bitten by the microbug a few years back. He decided he would write a TRS-80 version of the IBM Edgar text editor and print formatter in order to maximize his word processing efficiency."

The real power of Newscript is in its ability to do things that few other word processors can. Things like automatic table of contents and index generation, that store data in a disk file and automatically print out the index and table of contents, and mailing list insertion of text into form letters. Imagine printing 200 form letters with no operator intervention, each one personalized with name, address, and greeting plus other text inserted into the body of the letter. Headings, footings, titles, centered text and automatic page numbering are standard, as are hanging indents and offsets, multi-strike, double-wide letters and chaining of files. The latter means that a document can have an unlimited length, as each segment can be called by the previous segment. The operator may even be presented with a message stating which diskette to insert next if several diskettes are required.

Using Newscript is fairly easy, especially if the resident DOSPLUS is used. After making a backup copy, the user simply types AUTO NS, reboots the disk, and after a brief initialization, is presented with a customization menu. The next step is to choose which printer is in use, type of interface, and operating system in use. These parameters are stored for future reference and will be passed to the program automatically from then on. The user then chooses either EDIT or SCRIPT, or, if a new configuration is wanted, recustomization. Let's choose EDIT first. EDIT loads and then asks for the file name the first time through. Thereafter, the name is automatically passed back and forth between EDIT and SCRIPT. The file will load, or, if a new file, will open the new file. Then EDIT displays the maximum number of lines available for text entry. The program keeps track of the actual count and will warn you in plenty of time to start a new file.

Each line in EDIT must contain either a control word or normal text. Since most sentences normally never start with a period, control words are preceeded by a period to distinguish them from the text. Control words inform SCRIPT how to process the document. Typical control words are CE for center next lines, CM for comment line, DS for double space, JU for right justify, PN for page numbering and US for underscore string. There are 42 control words, giving the user a multitude of options. There are also 7 escape commands that control double-width, underlining, superscripting, subscripting and backspacing.

Text is entered via a standard typewriter keyboard, with shift-O acting as a shift lock. Automatic wrap-around occurs when the line length exceeds 60 characters. To insert, hit Clear-I and the flashing block cursor turns into a flashing "I". Characters are then inserted, pushing the old text to the right. To delete, hit Clear-D for each character you want deleted or Clear Spacebar to delete to the end of the line. There are 45 edit commands

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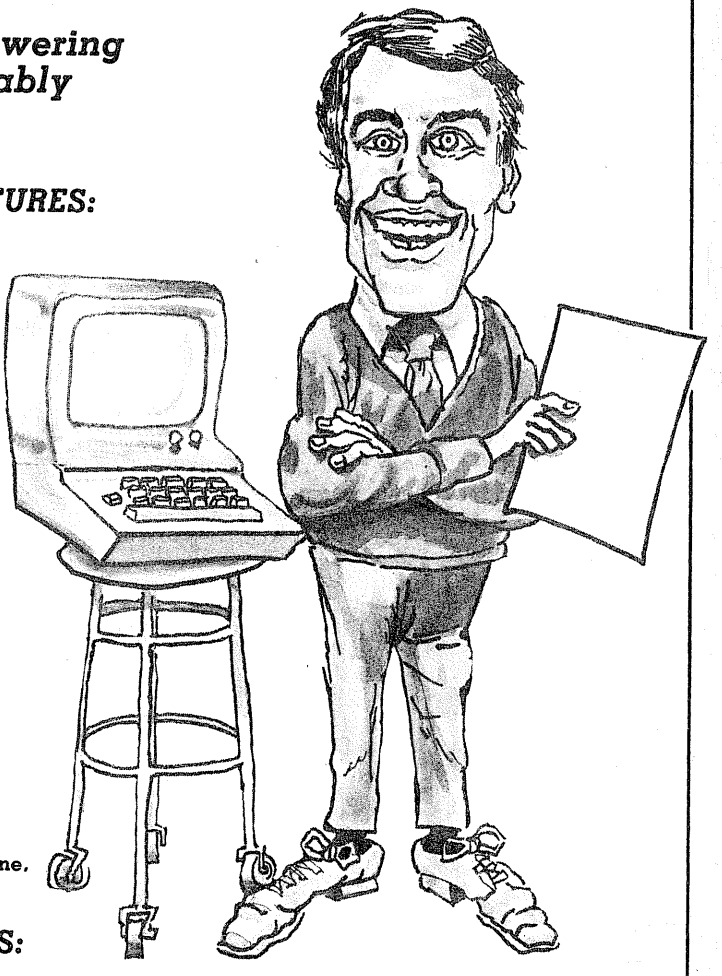

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*AUTOSAVE, WHOOPS, DIRECTORY, KILL, REPEAT

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*Includes handy Quick Reference Card

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*Centronics 737, 739; Radio Shack L.P. IV, L.P. VIII, Daisy Wheel II, NEC PC-8023A, TEC 8500R, C.ITOH 8510: Right-justified true proportional printing (ledding)

*Good support for: Diablo, Spinwriter, Starwriter, QUME, Microline, Anadex, modified Selectric

TYPICAL USER AND REVIEWER COMMENTS:

the manual:

"It definitely rates the first '10' given to any documentation reviewed in this column." (A.A. Wicks, COMPUTRONICS, October, 1981)

the software: "An excellent Word Processor" (D.H.); "Absolutely fantastic" (S.E.S.); "You have features that I cannot duplicate on my $14,000 system" (J.B.)

the support: "Your phone information system and the prompt and courteous staff that you provide to help your clients...are worth the cost of the system." (V.H.H.)

REQUIRED CONFIGURATION: 48K TRS-80 with one disk drive. Specify Model I or Model III.

† *Some features work only if your printer has the mechanical capability.*

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that can be issued to make editing easier. Typical commands include "Autosave", which automatically saves text to disk after a preset number of lines has been entered, "DIR", which gives a directory, "Change", which is much like "replace" in Scripsit and "GETFILE", which merges all or part of another file into the existing file. There are scrolling commands, like "TOP", "BOTTOM", "FORWARD" and "BACKPAGE". There are commands to help move text, delete text, save text, replace text, join text and even a command called "WHOOPS", that cancels all changes and clears the screen. All commands can be abbreviated to one or two letters and will work in upper or lower case.

After an editing session, the command "END" is typed, which saves the file to disk and ends the session. You are next asked if you want to pass the current file to SCRIPT for printing. If that is your desire, simply press <ENTER> and your file will be passed to the print formatter. There are several runtime options available in SCRIPT, such as: Number of copies, print darker (overstrike), video only, double and triple spacing, number lines in margin, interactive editing mode, print file identification in left margin, starting and ending pages to be printed, single-sheet stop, and print table of contents only. The interactive editing mode is interesting because it allows user control and editing while the file is being printed. Each line is displayed and the user is asked whether the line should be printed as is, replaced with a new line, deleted totally, or a new line inserted ahead of the current line. Any changes are immediately printed, but the changes are temporary and do not affect the original document.

Does the package work? Extremely well! Chuck Tesler has given us an outstanding word processor which far exceeds the capabilities of Scripsit, at a comparable price. Newscript is not perfect, it lacks some of the features that make Scripsit so handy, and the ease of use of Lazy Writer. My main complaint is that when in insert mode, the old text is pushed down on a new line, with no easy way to re-join the lines on the screen. To give the video text a neat appearance, the text may be reformatted by running a program called "Fitline", which makes every line a maximum of 60 characters long. This is only necessary to clean up the video and does not affect the print format as all blanks are ignored while printing.

Prosoft makes it a point to provide a telephone number which, while not toll-free, at least is accessible. This reviewer called Prosoft seven times and got through or received a call back every time. Chuck Tesler is very knowledgeable and is willing to answer any reasonable request for customer service. Each new revision of Newscript is available to existing customers for a minimal charge. We would like to see more software vendors take such a positive stance towards user support. Newscript certainly demands a serious look by those who are looking for an excellent value in a word processor. ■

Newscript Word Processor is available from Prosoft, Box 839, North Hollywood, California 91603 (213) 764-3131. For Model I or III with 48K and disk, the price is $99.95

An automatic tape SAVE program

For Models I/III, tape only Level II 4K and up

Jon Presley, Lebanon, MO

Have you ever tried to verify a program that took three hours to type and save on cassette? How many times have you attempted to verify a program using the CLOAD? command, and have the program disappear because the ENTER key was depressed instead of a question mark? What can you do if the original tape copy proves defective? These are questions concerning everyone operating a cassette based microcomputer.

AUTOSAVE might be the answer. It may be stored at the end of your existing program and help efficiently transfer programs on cassette. This auto save routine eases the storage process and helps eliminate mistakes.

SHORT is a compressed program with most prompts and needless elements deleted. Simply type LISTING 1 into your computer and then save it on cassette. Always load this program prior to a programming session. When the session is complete, type "RUN 65000" and two copies of your program will automatically be saved on cassette (be certain the recorder is set up for recording). SHORT uses about 220 bytes during run time and will fit at the end of almost any program.

LONG is expanded and more elegant. It is designed for use by an inexperienced operator and uses slightly more memory. Extra prompts and instructions are included to serve as a guide for correctly saving and checking two programs. An INKEY routine is included that will allow you to stop the program if it is accidentally entered or if you wish to stop execution. LONG is initiated by typing "RUN 65000". It uses about 1113 bytes of memory during run time. (See Listing 2.)

AUTOSAVE is easy to use. First, type either LONG or SHORT into memory and then save it on tape for future use. Next, type a small demonstration program ahead of Auto Load. Type "RUN 65000" and follow the video prompts.

When using these programs a few simple procedures will aid production of cassette files. Your program must have line numbers lower than 65000 and contain an END statement. This keeps the computer from crashing into the save routine. If you already have an existing program in memory and want to add AUTOSAVE or, alternately, if AUTOSAVE is in memory and you want to add another program, then use a chaining program,.

Be aware that when short programs (under 5000 bytes) are saved or checked, there usually is little trouble if the system is working correctly. The risk of error in longer programs increases in proportion to the length. A 16,000 byte program is almost impossible to save without an error unless you are using a new certified digital tape. Who can afford certified tapes?

It is essential that the cassette player is clean and that you use good operating habits. Clean the capstan and the two heads of the tape player at least once each week. Use good quality tape and shop around for the best price. At present, fine quality C-10 tapes may be purchased for about 70 cents apiece.

When a CSAVE is performed, double-check that both the play and record buttons have been depressed. I have tried to record a few tapes in the past with only the play button pressed. It does not work! Keep the tape recorder turned off when not in use. If left in the play or record mode, a strain is placed on the tape and a deformity may occur which could cause bit information to be lost. If this happens to your tape, throw it away!

Stop the recorder immediately after rewinding or rapidly advancing a tape. Otherwise, the entire tape will eventually stretch. A 30 minute tape might be converted to one with 45 minutes of playing time. This is not a recommended way to add to your library. ■

Listing 1

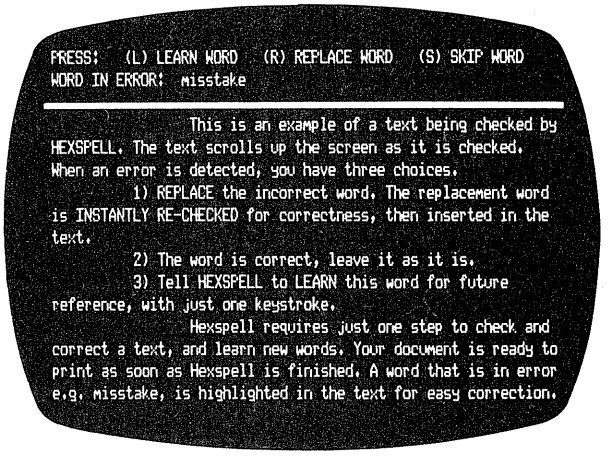
```
65000 INPUT "READY RECORDER"; Z : FOR I
   = 1 TO 2 : PRINT "NOW LOADING" : CSA
  VE ";I;" : OUT 255, 4 : FOR J = 1 TO
  600 : NEXT J : OUT 255, 16 : NEXT I :
   PRINT "NOW COMPLETE" : INPUT "PRESS
  1 AND ENTER TO CHECK"; R : IF R = 1 T
  HEN PRINT
65001 CLOAD PRINT
```

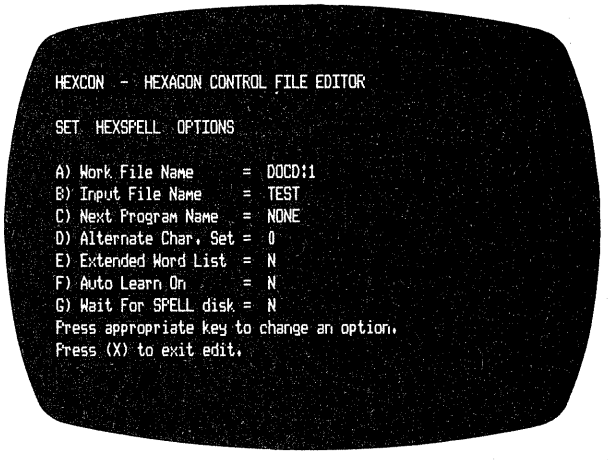
Listing 2

```
65000 CLS : PRINT "T A P E     L O A D
  I N G     R O U T I N E :" : PRINT
65001 CLS : INPUT "WHAT IS THE PROGRAM
  I.D. LETTER"; Z$ : PRINT "READY THE R
  ECORDER BY PRESSING PLAY AND RECORD O
  N THE RECORDER
RESET AND NOTE COUNTER NUMBER" : GOSUB
  65011
65002 FOR I = 1 TO 2 : CLS : PRINT "NOW
   LOADING "; Z$; I : CSAVE # - 1, Z$ :
   OUT 255, 4 : FOR J = 1 TO 600 : NEXT
   J : OUT 255, 16 : NEXT I
65003 PRINT "2 PROGRAMS ARE NOW RECORDE
  D
TO CHECK " : GOSUB 65011
65004 CLS : PRINT "REWIND RECORDER TO S
  TART OF PROGRAMS
IF AT ANY TIME 'BAD' IS DISPLAYED NEW P
  ROGRAMS MUST BE RECORDED
AND YOU MUST TYPE 'RUN 65001' AND START
   OVER" : GOSUB 65011
65005 X = 1 : GOTO 65007
65006 X = 2
65007 PRINT "NOW CHECKING "; X : IF X =
   1 THEN 65008 ELSE PRINT "TYPE 'RUN 6
  5009' WHEN 'READY' IS PRINTED" : C LO
  AD PRINT
65008 PRINT "AFTER COMPUTER STATES 'REA
  DY' TYPE 'RUN 65006'" : CLOAD PRINT

65009 PRINT "CHECKING IS COMPLETE
BOTH PROGRAMS HAVE BEEN LOADED CORRECTL
  Y
IF YOU DESIRE TO DELETE THIS PROGRAM TH
  EN " : GOSUB 65011
65010 DELETE 65000 - 65012
65011 PRINT "PRESS   '1'   TO CONTINUE
    '0'   TO END"
65012 A$ = INKEY$ : IF A$ = "" THEN 650
  12 ELSE IF A$ = "1" THEN RETURN ELSE
  IF A$ = "0" THEN END ELSE 65012
```

Looking for a
SPELLING CHECKER





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When we introduced Hexspell nearly a year ago, it was the world's first adaptive learning spelling checker. Hexspell constantly adapts its wordlist to your usage. No complicated editing of the wordlist. Hexspell remembers words as long as you use them. If you never use a word again Hexspell will eventually forget it to make room for new words. Extending this feature in Hexspell 2 gives you a text checker that can learn to check everything that you write.

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Richard Maeso, Vashon, WA

The Pocket Computer can be a versatile, cost-effective tool if used wisely. The failure to fully understand its functions has prevented many professionals and novices from purchasing it. In reality, the Pocket Computer has no serious competition and its function in life is mostly uncharted.

A Radio Shack Pocket Computer was purchased and experimented with in its four operating modes. No matter how we approached an application, something prevented us from developing a meaningful program. Memory size was not the cause. Our problem was solved by adding a printer/cassette interface.

We had observed a payroll program published in the Pocket Computer Newsletter. This program accepted gross pay, number of exemptions and marital status to calculate and display federal withholding and FICA taxes. It allowed only one other withholding deduction, then calculated and displayed the net pay. From an accounting standpoint, it lacked sufficient flexibility.

The question was, could we design a program which incorporates greater accounting flexibility and use the printer effectively for the business environment? Our objective was to add more accounting features: multiple entry, other income and deduction queries and year-to-date figures for tax purposes. We wanted to subtotal the results and produce the required journal entries for the period. We also wanted to produce a document containing each individual's earnings. As accounting and data processing professionals, we found the resulting program combined speed and accuracy for the experienced payroll user as well as guidance for the novice. Figures one and two show an actual sample output from a hypothetical payroll.

We discovered some new tricks which helped achieve our original goal. These are logical methods which could be applied to many applications.

—Condense code into as few lines as possible.

—Use function keys which optimize the program.

—Use the INPUT statements' formula capability: (125*2)+1 instead of 251.

—Use the printer to provide a copy of input and output.

To help demonstrate the effect of using the above methods we have selected an article: "Traveling with the Pocket Computer", as found in the September/October 1981 issue of *80-U.S. Journal*, pages 86-87. We derived the following

Figure 1

Sample printout showing data entered for an employee:

```
*SEMI*:  4-2605
*YTD*   22348.72

REG =     932.00
OTH =     209.70
OTH =     139.80
GROSS    1281.50

FWT =     229.74
FICA=      85.86
DED1=      13.40
DED2=       0.98
DED3=       5.52
DED3=      25.00
DEDS     360.50

NET      921.00

*YTD*   23630.22
```

Figure 2

Sample printout showing the subtotals of a payroll period. These would be used as journal entries.

```
*TOTAL*

REG =    2432.00
OTH =     349.50
GROSS    2781.50

FWT =     546.51
FICA=     186.36
DED1=      38.40
DED2=       4.58
DED3=      30.52
DEDS     806.37

NET     1975.13
```

BISI Beaver Software, P.O. Box 70, Vashon, Washington 98115.

version by applying function keys, relocating gosub routines and condensing lines.

These methods and others are being used in our own software for the pocket computer. They are practical, cost-effective applications for use in the home, business and educational fields.

Listing 1 (Reprint)

```
10:"A"GOTO 40

20:INPUT "HOURS=";H
25:INPUT "MINUTES=";M
30:P=H+M/60:RETURN
40:X=0
45:USING "#####.##"
50:INPUT "1.INIT 2.START 3.STOP ";X
55:IF X=0GOTO 5
60:IF X=1GOTO 90
65:IF X=2GOTO 110
70:IF X=3GOTO 170
90:CLEAR
100:INPUT "FUEL IN TANK ";D
110:INPUT "STARTING MILES= ";A


120:PAUSE "STARTING TIME"
125:GOSUB 20
130:INPUT "MILES TO DEST. ";I
155:E=18-D
160:T=P
165:PAUSE "FINISHED":END
170:PAUSE "STOPPING"
180:INPUT "STOPPING MILEAGE";B
185:IF B=0GOTO 340
190:K=K+B-A
195:PAUSE "STOPPING TIME"
200:GOSUB 20

205:V=V+P-T
210:C=(B-A)/(P-T)



215:INPUT "FUEL ADDED ";F
220:N=N+B-A

225:IF F=0GOTO 280
230:D=18
250:G=F-E
255:L=L+G
260:J=N/G
270:PRINT "MPG=";J
275:N=0
280:PRINT "MPH=";C

282:R=I-K
283:PRINT "MILES TO DEST. ";R
285:PAUSE "FINISHED":END
340:GOSUB 410

342:PAUSE "DRIVING TIME"
344:PRINT O;" HRS";S;" MIN"
345:W=K/V
350:PRINT "TOTAL MILES=";K


355:PRINT "AVERAGE TRIP MPH ";W
357:R=I-K
358:PRINT "MILES TO DEST. ";R
360:IF F=0THEN GOTO 400

370:PRINT "TOTAL GALLONS ";L
380:Q=K/L
290:PRINT "TRIP MPG=";Q
400:PAUSE "FINISHED":END
410:O=INT (V)
420:S=(V-O)*60:RETURN
```

Listing 2 (Condensed)

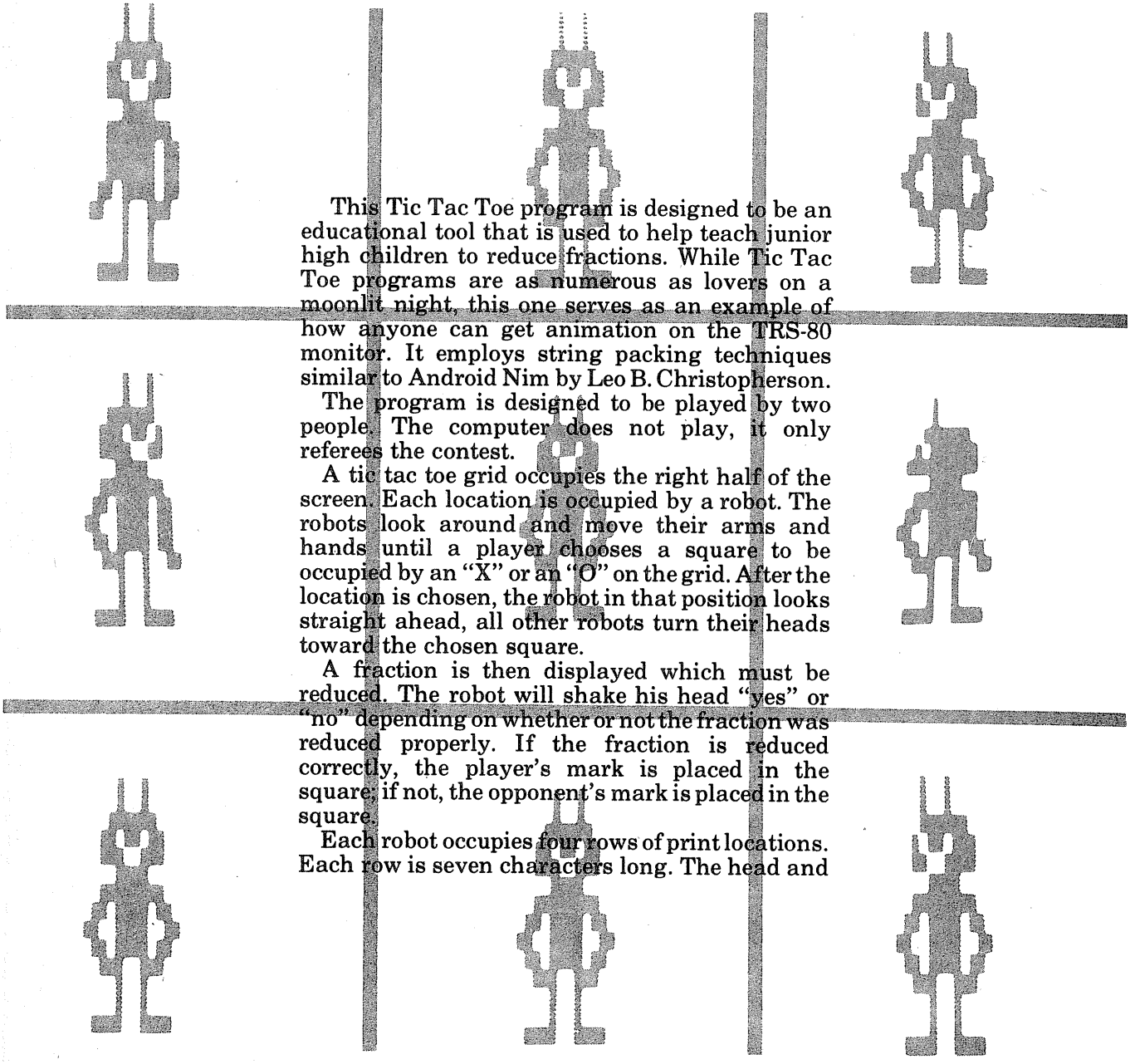
```
10:PAUSE "STARTING TIME":GOTO 20
15:PAUSE "STOPPING TIME"
20:INPUT "HOURS? ";H
  :INPUT "MINUTES? ";M:P=H+M/60:RETURN
30:O=INT (V):S=(V-O)*60:RETURN



100:"Z":CLEAR :INPUT "FUEL IN TANK? ";D
110:"B"INPUT "STARTING MILES? ";A
   :GOSUB 10:INPUT "MILES TO DEST.? ";I
   :E+18-D:T=P
120:BEEP 2:PAUSE "TIMES A WASTING!":END



200:"D"INPUT "STOP MILEAGE ";B
   :USING "#####.##":IF B=0GOTO 200

210:K=K+B-A:GOSUB 15:V=V+P-T
   :C=(B-A)/(P-T)
   :INPUT "FUEL ADDED? ";F:N=N+B-A
   :IF F=0GOTO 280

220:D=18:G=F-E:L=L+G:J=N/G
   :PRINT "MPG= ";J:N=0



280:PRINT "MPH= ";C:R=I-K
   :PRINT "MILES TO DEST. ";R:GOTO 400



340:"S"GOSUB 30:PRINT "DRIVING TIME"
   :PRINT O;" HOURS":PRINT S;" MIN"


350:W=K/V:PRINT "TOTAL MILES= ";K
   :PRINT "AVERAGE TRIP MPH ";W:R=I-K
   :PRINT "MILES TO DEST. ";R
355:IF F=0GOTO 400


360:PRINT "TOTAL GALLONS ";L:Q=K/L
   :PRINT "TRIP MPG=";Q



400:PAUSE "FINISHED":END
```

Tic Tac Toe

Learning the reduction of fractions by playing games

For Models I and III, tape or disk

Ralph G. White, Columbus, KS



This Tic Tac Toe program is designed to be an educational tool that is used to help teach junior high children to reduce fractions. While Tic Tac Toe programs are as numerous as lovers on a moonlit night, this one serves as an example of how anyone can get animation on the TRS-80 monitor. It employs string packing techniques similar to Android Nim by Leo B. Christopherson.

The program is designed to be played by two people. The computer does not play, it only referees the contest.

A tic tac toe grid occupies the right half of the screen. Each location is occupied by a robot. The robots look around and move their arms and hands until a player chooses a square to be occupied by an "X" or an "O" on the grid. After the location is chosen, the robot in that position looks straight ahead, all other robots turn their heads toward the chosen square.

A fraction is then displayed which must be reduced. The robot will shake his head "yes" or "no" depending on whether or not the fraction was reduced properly. If the fraction is reduced correctly, the player's mark is placed in the square; if not, the opponent's mark is placed in the square.

Each robot occupies four rows of print locations. Each row is seven characters long. The head and

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By Chuck Acree

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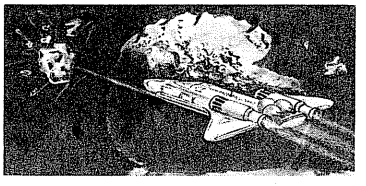

SPACE ROCKS

By Steven Kearns

Huge antimatter rocks appear on the Tactical Display Screen of your spacecraft. You blast away but they just explode into smaller chunks for you to destroy. To add to your woes, alien ships and time bombs appear periodically. If the ships hit you or the timers reach zero—BOOM! Maneuver, fire lasers, jump to hyperspace—anything to avoid the onslaught. For one or two players, with nine skill levels.

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neck of the robots are drawn in the upper two rows while the arms, legs and body occupy the lower two. The strings that supply the values needed for head movement are in the H$ array. The arms, legs and hands are stored in the A$ array. The M$ array holds the "O" and the "X" marks.

For those not familiar with this technique, run the program as is. The computer should pause and respond with BREAK IN 90. At this point, if you list the program, you should find that all of the neat blank strings that were typed are now filled with the most hideous appearing collection of command words imaginable. Do not tamper with these lines! They are supposed to look that way. After reluctantly accepting their appearance, delete lines 80, 90 and the entire subroutine in lines 40000 to 43007. The information is now permanently part of the program and may be saved or loaded from tape or disk as usual.

Program Notes

Each input is tested for its appropriateness before being accepted. This is to prevent an invalid input from wrecking the formatted video display.

The H$ arrays and M$ arrays are each seven blanks in length; the A$ arrays are each three blanks long. The 26 H$ array values are the data statements 41000 to 41025. The 12 A$ arrays are in lines 42000 to 42011. The eight M$ values are in statements 43000 to 43007.

Major Routines

Lines 1150 to 1170 generate the fractions to be reduced and the answers.

Lines 1200 to 1300 are the input section for the answer to the problem.

Lines 1550 to 1557 check for a winner after each move.

The subroutine in lines 21000 to 21310 generates the head and arm movements of the robots.

The subroutine in lines 25000 to 25160 turns all heads in the appropriate direction.
heads in the appropriate direction. ■

Tic Tac Toe Listing

```
10 DIM P$(4), H$(26), A$(12), M$(8), P(
   3, 9)
15 FOR T = 1 TO 9 : PL(T) = 0 : NEXT
20 FOR O = 1 TO 2 : FOR T = 1 TO 9 : P(
   O, T) = 0 : NEXT : NEXT
40 H$(1)="       " : H$(2)="       "
41 H$(3)="       " : H$(4)="       "
42 H$(5)="       " : H$(6)="       "
43 H$(7)="       " : H$(8)="       "
44 H$(9)="       " : H$(10)="       "
45 H$(11)="       ": H$(12)="       "
46 H$(13)="       ": H$(14)="       "
47 H$(15)="       ": H$(16)="       "
48 H$(17)="       ": H$(18)="       "
49 H$(19)="       ": H$(20)="       "
50 H$(21)="       ": H$(22)="       "
51 H$(23)="       ": H$(24)="       "
52 H$(25)="       ": H$(26)="       "
55 A$(1) = "   " : A$(2) = "   "
56 A$(3) = "   " : A$(4) = "   "
57 A$(5) = "   " : A$(6) = "   "
58 A$(7) = "   " : A$(8) = "   "
59 A$(9) = "   " : A$(10) = "   "
60 A$(11) = "   " : A$(12) = "   "
65 M$(1)="       ": M$(2)="       "
66 M$(3)="       ": M$(4)="       "
67 M$(5)="       ": M$(6)="       "
68 M$(7)="       ": M$(8)="       "
70 L$ = "-----  =  -----"
75 B$ = "                    "
80 GOSUB 40000
90 STOP
100 CLS : PRINT CHR$(23) : PRINT : PRIN
   T : PRINT
101 A$ = "################"
102 PRINT A$; A$
110 PRINT TAB(9)"TIC  TAC  TOE" : PRINT

115 PRINT A$; A$
120 FOR TM = 1 TO 1500 : NEXT
130 CLS
200 PRINT TAB(20)">> INSTRUCTIONS <<" :
    PRINT
210 PRINT "THE FOLLOWING GAME IS FOR TW
   O PLAYERS.  IT IS PLAYED  AS A"
220 PRINT "NORMAL 'TIC TAC TOE' GAME EX
   CEPT TO PLACE YOUR MARK IN A"
230 PRINT "SQUARE, YOU MUST REDUCE A FR
   ACTION TO LOWEST TERMS FIRST.  IF"
240 PRINT "YOU ANSWER CORRECTLY, YOU GE
   T TO PLACE YOUR MARK.  IF YOU"
250 PRINT "ANSWER INCORRECTLY, YOUR OPP
   ONENT'S MARK WILL BE PLACED IN THE"
260 PRINT "SQUARE.  IF YOUR ANSWER IS A
    ONE DIGIT NUMBER FOR THE NUMERATOR"
270 PRINT "AND DENOMINATOR, PRESS THE D
   ECIMAL POINT (PERIOD) AFTER THE ONE"
280 PRINT "DIGIT.  OTHERWISE, THE COMPU
   TER WILL AUTOMATICALLY REGISTER THE"
290 PRINT "ANSWER.  BEST OF LUCK TO BO
   TH OF YOU!" : PRINT : PRINT
900 INPUT "WHAT IS THE NAME OF THE PLAY
   ER FOR 'O'"; P$(1) : IF LEN(P$(1)) >
   10 GOTO 900
901 PRINT : INPUT "WHAT IS THE NAME OF
   THE PLAYER FOR 'X'"; P$(2) : IF LEN(P
   $(2)) > 10 GOTO 901
```

```
910 IS = RND(2)
1000 CLS
1010 FOR I = 0 TO 45 : SET(88, I) : SET
  (89, I) : SET(108, I) : SET(109, I) :
   NEXT
1020 FOR I = 70 TO 127 : SET(I, 16) : S
  ET(I, 31) : NEXT
1030 PRINT@ 163, "1"; : PRINT@ 173, "2"
  ; : PRINT@ 183, "3"; : PRINT@ 483, "4
  "; : PRINT@ 493, "5"; : PRINT@ 503, "
  6"; : PRINT@ 803, "7"; : PRINT@ 813,
  "8"; : PRINT@ 823, "9";
1040 PRINT@ 0, P$(1); " IS 'O'.";
1041 PRINT@ 64, P$(2); " IS 'X'.";
1050 FOR C = 0 TO 2 : FOR R = 0 TO 2
1051 P = 100 + 320 * R + 10 * C : PRINT
  @ P, H$(1); : PRINT@ P + 64, H$(2); :
   PRINT@ P + 128, A$(RND(3)); CHR$(191
  ); A$(RND(3) + 6); : PRINT@ P + 192,
  A$(RND(3) + 3); CHR$(128); A$(RND(3)
  + 9);
1052 NEXT : NEXT
1100 PRINT@ 128, B$; : PRINT@ 128, P$(I
  S); "'S TURN";
1105 PRINT@ 448, B$; : PRINT@ 453, B$;

1110 PRINT@ 320, "WHICH SQUARE DO YOU W
  ISH?";
1120 S$ = INKEY$ : IF S$ <> "" GOTO 113
  0
1122 GOSUB 21000
1125 GOTO 1120
1130 S = INT(VAL(S$)) : IF S < 1 OR S >
   9 GOTO 1120
1135 IF PL(S) > 0 GOTO 1110
1137 GOSUB 25000
1140 PL(S) = 1
1150 DN = RND(15) + 1 : NU = RND(DN - 1
  )
1160 U1 = DN : U2 = NU
1161 U1 = ABS(U1) : U2 = ABS(U2)
1162 R = U1 - U2 * INT(U1/U2) : IF R =
  0 GOTO 1164
1163 U1 = U2 : U2 = R : GOTO 1161
1164 GF = U2
1165 IF GF <> 1 GOTO 1150
1170 MF = RND(9) : LN = NU * MF : LD =
  DN * MF
1200 PRINT@ 448, "REDUCE THIS FRACTION:
  ";
1210 PRINT@ 576, L$; : PRINT@ 513, LN;
  : PRINT@ 641, LD;
1215 PRINT@ 704, "NUMERATOR?";
1220 P = 523 : GOSUB 20000
1224 N$ = INKEY$
```

```
1225 N$ = INKEY$ : IF N$ = "" GOTO 1225

1235 SN = VAL(N$) : IF SN < 0 OR SN > 9
   GOTO 1225
1236 PRINT@ P + 1, SN;
1240 N$ = INKEY$ : IF N$ = "" GOTO 1240

1245 IF N$ = "." GOTO 1255
1246 IF ASC(N$) < 48 OR ASC(N$) > 57 GO
  TO 1240
1250 SN = 10 * SN + VAL(N$)
1255 PRINT@ P, SN;
1260 PRINT@ 704, B$;
1265 PRINT@ 704, "DENOMINATOR?";
1270 P = 651 : GOSUB 20000
1274 N$ = INKEY$
1275 N$ = INKEY$ : IF N$ = "" GOTO 1275

1280 SD = VAL(N$) : IF SD < 0 OR SD > 9
   GOTO 1275
1285 PRINT@ P + 1, SD;
1290 N$ = INKEY$ : IF N$ = "" GOTO 1290

1292 IF N$ = "." GOTO 1300
1293 IF ASC(N$) < 47 OR ASC(N$) > 57 GO
  TO 1290
1295 SD = 10 * SD + VAL(N$)
1300 PRINT@ P, SD;
1310 PRINT@ 704, B$;
1320 P = 100 + 320 * INT((S - 1)/3) + 1
  0 *(S - 3 * INT((S - 1)/3) - 1)
1400 IF SN = NU AND SD = DN GOTO 1440
1405 PRINT@ 768, "NOT A CHANCE.";
1406 PRINT@ 833, NU; : PRINT@ 896, "---
  --"; : PRINT@ 961, DN;
1410 FOR I = 1 TO 5 : PRINT@ P, H$(12);
   : PRINT@ P + 64, H$(13); : FOR TM =
  1 TO 20 : NEXT : PRINT@ P, H$(14); :
  PRINT@ P + 64, H$(15); : FOR TM = 1 T
  O 30 : NEXT
1411 PRINT@ P, H$(12); : PRINT@ P + 64,
   H$(13); : FOR TM = 1 TO 20 : NEXT :
  PRINT@ P, H$(1); : PRINT@ P + 64, H$(
  2); : FOR TM = 1 TO 20 : NEXT
1412 PRINT@ P, H$(4); : PRINT@ P + 64,
  H$(5); : FOR TM = 1 TO 20 : NEXT : PR
  INT@ P, H$(6); : PRINT@ P + 64, H$(7)
  ; : FOR TM = 1 TO 30 : NEXT : PRINT@
  P, H$(4);
1413 PRINT@ P + 64, H$(5); : FOR TM = 1
   TO 20 : NEXT : PRINT@ P, H$(1); : PR
  INT@ P + 64, H$(2); : FOR TM = 1 TO 2
  0 : NEXT : NEXT
1420 FOR TM = 1 TO 400 : NEXT
1422 FOR LC = 832 TO 960 STEP 64 : PRIN
  T@ LC, B$; : NEXT
1424 IF IS = 1 THEN J = 2
1425 IF IS = 2 THEN J = 1
1430 GOTO 1510
1440 J = IS
1445 PRINT@ 768, "ABSOLUTELY RIGHT!";
1450 FOR I = 1 TO 5 : PRINT@ P, H$(26);
   : PRINT@ P + 64, H$(21); : FOR TM =
  1 TO 20 : NEXT : PRINT@ P, H$(1); : P
  RINT@ P + 64, H$(2); : FOR TM = 1 TO
  20 : NEXT
1451 PRINT@ P, H$(3); : PRINT@ P + 64,
  H$(25); : FOR TM = 1 TO 20 : NEXT : P
  RINT@ P, H$(1); : PRINT@ P + 64, H$(2
  ); : FOR TM = 1 TO 20 : NEXT : NEXT
1460 FOR TM = 1 TO 200 : NEXT
1510 FOR Z = 0 TO 3
1520 PRINT@ P + 64 * Z, M$(1 + Z +((J -
   1) * 4));
1530 NEXT
1540 P(J, S) = 1
1550 IF P(J, 1) + P(J, 2) + P(J, 3) = 3
   GOTO 2000
1551 IF P(J, 4) + P(J, 5) + P(J, 6) = 3
   GOTO 2000
1552 IF P(J, 7) + P(J, 8) + P(J, 9) = 3
   GOTO 2000
1553 IF P(J, 1) + P(J, 4) + P(J, 7) = 3
   GOTO 2000
1554 IF P(J, 3) + P(J, 6) + P(J, 9) = 3
   GOTO 2000
1555 IF P(J, 2) + P(J, 5) + P(J, 8) = 3
   GOTO 2000
1556 IF P(J, 1) + P(J, 5) + P(J, 9) = 3
   GOTO 2000
1557 IF P(J, 7) + P(J, 5) + P(J, 3) = 3
   GOTO 2000
1560 PRINT@ 320, B$; : PRINT@ 512, B$;
  : PRINT@ 640, B$; : PRINT@ 704, B$; :
   PRINT@ 768, B$;
1561 SM = 0 : FOR I = 1 TO 9 : SM = SM
  + PL(I) : NEXT
1562 IF SM = 9 GOTO 1600
1565 IF IS = 1 GOTO 1580
1570 IS = IS - 1 : GOTO 1100
1580 IS = IS + 1 : GOTO 1100
1600 PRINT@ 832, "NO WINNER FOR THIS GA
  ME."; : FOR TM = 1 TO 2000 : NEXT : E
  ND
2000 PRINT@ 832, P$(J); " IS THE WINNER
  !";
2010 FOR TM = 1 TO 3000 : NEXT : CLS :
  END
20000 FOR I = 1 TO 5 : PRINT@ P, "###";
   : FOR TM = 1 TO 120 : NEXT : PRINT@
  P, "   "; : FOR TM = 1 TO 80 : NEXT
  : NEXT : RETURN
```

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```
21000 PM = RND(9) : IF PL(PM) > 0 THEN
  RETURN
21110 H = INT((PM - 1)/3) : G =(PM - 1)
   - H * 3 : PL = 100 + 320 * H + 10 *
  G
21200 M = RND(11) : ON M GOTO 21210, 21
  220, 21230, 21240, 21250, 21260, 2127
  0, 21280, 21290, 21300, 21310
21210 PRINT@ PL, H$(1); : PRINT@ PL + 6
  4, H$(2); : RETURN
21220 PRINT@ PL, H$(4); : PRINT@ PL + 6
  4, H$(5); : RETURN
21230 PRINT@ PL, H$(12); : PRINT@ PL +
  64, H$(13); : RETURN
21240 PRINT@ PL, H$(20); : PRINT@ PL +
  64, H$(21); : RETURN
21250 PRINT@ PL, H$(22); : PRINT@ PL +
  64, H$(21); : RETURN
21260 PRINT@ PL, H$(3); : PRINT@ PL + 6
  4, H$(25); : RETURN
21270 PRINT@ PL, H$(3); : PRINT@ PL + 6
  4, H$(23); : RETURN
21280 PRINT@ PL, H$(3); : PRINT@ PL + 6
  4, H$(24); : RETURN
21290 PRINT@ PL, H$(26); : PRINT@ PL +
  64, H$(21); : RETURN
21300 PRINT@ PL + 128, A$(RND(3)); : PR
  INT@ PL + 192, A$(RND(3) + 3); : RETU
  RN
21310 PRINT@ PL + 132, A$(RND(3) + 6);
  : PRINT@ PL + 196, A$(RND(3) + 9); :
  RETURN
25000 D = INT((S - 1)/3) + 1 : R = S -(
  D - 1) * 3
25005 FOR I = 1 TO 9
25006 IF PL(I) > 0 GOTO 25150
25010 V = INT((I - 1)/3) + 1 : H = I -(
  V - 1) * 3
25020 P = 100 + 320 *(V - 1) + 10 *(H -
   1)
25030 IF D = V AND H = R THEN PRINT@ P,
   H$(1); : PRINT@ P + 64, H$(2); : GOT
  O 25150
25040 IF D = V AND H > R THEN PRINT@ P,
   H$(18); : PRINT@ P + 64, H$(19); : G
  OTO 25150
25050 IF D = V AND H < R THEN PRINT@ P,
   H$(10); : PRINT@ P + 64, H$(11); : G
  OTO 25150
25060 IF D < V AND H = R THEN PRINT@ P,
   H$(26); : PRINT@ P + 64, H$(21); : G
  OTO 25150
25070 IF D > V AND H = R THEN PRINT@ P,
   H$(3); : PRINT@ P + 64, H$(25); : GO
  TO 25150
25080 IF D < V AND H < R THEN PRINT@ P,
   H$(22); : PRINT@ P + 64, H$(21); : G
  OTO 25150
25090 IF D < V AND H > R THEN PRINT@ P,
   H$(20); : PRINT@ P + 64, H$(21); : G
  OTO 25150
25100 IF D > V AND H < R THEN PRINT@ P,
   H$(3); : PRINT@ P + 64, H$(24); : GO
  TO 25150
25110 IF D > V AND H > R THEN PRINT@ P,
   H$(3); : PRINT@ P + 64, H$(23);
25150 NEXT
25160 RETURN
40000 RESTORE
40010 FOR R = 1 TO 26
40020 X = PEEK(VARPTR(H$(R)) + 2) * 256
   + PEEK(VARPTR(H$(R)) + 1)
40030 FOR Q = 1 TO 7 : READ U : POKE X
  + Q - 1, U : NEXT
40040 NEXT
40050 FOR R = 1 TO 12
40060 X = PEEK(VARPTR(A$(R)) + 2) * 256
   + PEEK(VARPTR(A$(R)) + 1)
40070 FOR Q = 1 TO 3 : READ U : POKE X
  + Q - 1, U : NEXT
40080 NEXT
40090 FOR R = 1 TO 8
40100 X = PEEK(VARPTR(M$(R)) + 2) * 256
   + PEEK(VARPTR(M$(R)) + 1)
40110 FOR Q = 1 TO 7 : READ U : POKE X
  + Q - 1, U : NEXT
40120 NEXT
40130 RETURN
41000 DATA 128, 186, 159, 191, 175, 181
  , 128
41001 DATA 128, 138, 143, 188, 143, 133
  , 128
41002 DATA 128, 186, 191, 191, 191, 181
  , 128
41003 DATA 128, 186, 191, 175, 159, 181
  , 128
41004 DATA 128, 138, 143, 189, 142, 133
  , 128
41005 DATA 128, 170, 191, 159, 191, 149
  , 128
41006 DATA 128, 138, 143, 191, 140, 133
  , 128
41007 DATA 128, 170, 191, 191, 175, 149
  , 128
41008 DATA 128, 138, 143, 191, 141, 132
  , 128
41009 DATA 128, 170, 191, 191, 159, 149
  , 128
41010 DATA 128, 138, 143, 191, 143, 135
  , 128
41011 DATA 128, 186, 175, 159, 191, 181
  , 128
```

```
41012 DATA 128, 138, 141, 190, 143, 133
  , 128
41013 DATA 128, 138, 191, 175, 191, 149
  , 128
41014 DATA 128, 138, 140, 191, 143, 133
  , 128
41015 DATA 128, 170, 159, 191, 191, 149
  , 128
41016 DATA 128, 136, 142, 191, 143, 133
  , 128
41017 DATA 128, 170, 175, 191, 191, 149
  , 128
41018 DATA 128, 139, 143, 191, 143, 133
  , 128
41019 DATA 128, 186, 155, 167, 191, 181
  , 128
41020 DATA 128, 138, 143, 191, 143, 133
  , 128
41021 DATA 128, 186, 191, 155, 167, 181
  , 128
41022 DATA 128, 138, 166, 185, 143, 133
  , 128
41023 DATA 128, 138, 143, 182, 153, 133
  , 128
41024 DATA 128, 138, 173, 179, 158, 133
  , 128
41025 DATA 128, 186, 183, 143, 187, 181
  , 128
42000 DATA 168, 151, 171
42001 DATA 136, 183, 171
42002 DATA 128, 191, 171
42003 DATA 130, 177, 186
42004 DATA 128, 179, 186
42005 DATA 128, 178, 187
42006 DATA 151, 171, 148
42007 DATA 151, 187, 132
42008 DATA 151, 191, 128
42009 DATA 183, 177, 128
42010 DATA 181, 179, 128
42011 DATA 181, 178, 129
43000 DATA 191, 131, 131, 131, 131, 131
  , 191
43001 DATA 191, 128, 128, 128, 128, 128
  , 191
43002 DATA 191, 128, 128, 128, 128, 128
  , 191
43003 DATA 191, 176, 176, 176, 176, 176
  , 191
43004 DATA 139, 180, 128, 128, 128, 184
  , 135
43005 DATA 128, 130, 173, 176, 158, 129
  , 128
43006 DATA 128, 160, 158, 131, 173, 144
  , 128
43007 DATA 184, 135, 128, 128, 128, 139
  , 180
```

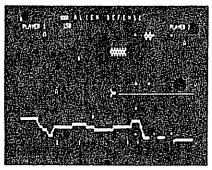
THE PROGRAM STORE

-80 SPACE RAIDERS

From Bosen Electronics
You are in command of the Starship "Defiant." The center of the screen is your "window" to the vastness of three dimensional space. Above and below it are readouts of critical information. Your orders are simple enough: Patrol the area and destroy all enemy spacecraft; return to base as needed for repairs and supplies. Carrying out these orders is more difficult!

An exciting and fast-paced game, -80 SPACE RAIDERS presents a flicker-free, animated view of the action from the pilot's perspective. Remarkably realistic.

16K tape...$24.95



ALIEN DEFENSE

By Larry Ashmun from Soft Sector
Piloting your ship across the horizontally moving terrain, you must battle the various enemy spacecraft. You are under attack almost constantly from missiles and bombs, and to make matters worse, your ground patrol people are being picked up by the alien landers. To save them, you must shoot the landers and swoop down to "catch" the falling man. This fast action game requires skill and rapid reflexes. The model III version makes excellent use of that model's special graphic features.

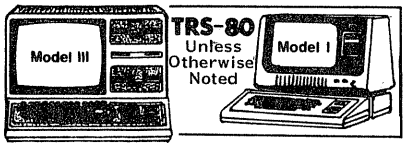
Model I, Tape: $19.95 Disk: $24.95
Model III, Tape: $19.95 Disk: $24.95

DEATH-MAZE 5000

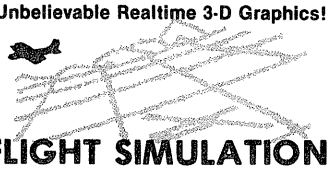
From Med Systems
A new breed of adventuring! Venture through a graphically represented 3-D maze, with halls that could dead end -- or recede to infinity. Step through the doors or drop into the pits. Will you encounter monsters and mayhem, or will you be treated to useful objects and information? Will you ever get out alive?

TRS-80 (16K tape), Apple (32K tape) $14.95
TRS-80 (32K disk) $17.95
Hint sheet....$1.00

Also Available: ASYLUM for TRS-80:
16K tape..$19.95, 32K disk..$22.95
Hint sheet....$1.00



NOW FOR MODELS I OR III !
Unbelievable Realtime 3-D Graphics!



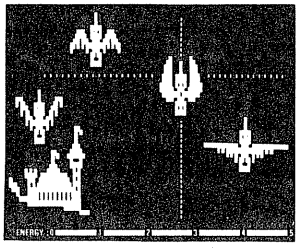
FLIGHT SIMULATION

From Sub-Logic
The wait is over! If 3-D graphics seem impossible on the low resolution TRS-80, you haven't seen this brilliant program. During FLIGHT SIMULATION, you instantly select instrument flight, radar, or a breathtaking pilot's-eye-view. But be sure to strap yourself in -- you're liable to get dizzy!

Once you put in some air time learning to fly your TRS-80, head for enemy territory and try to bomb the fuel depot while fighting off five enemy warplanes. Good Luck!

NOW FOR MODELS I & III!
16K tape (specify I or III)...$25.00
32K disk (specify I or III)...$33.50

VOYAGE OF THE VALKYRIE



By Leo Christopherson from AOS
Combine the animation and music techniques pioneered by Christopherson with the challenge of his first fast-moving arcade game and you have VOYAGE TO VALKYRIE!

You speed through a magical maze guarded by ferocious birds that swoop down to attack if you don't get them first. To list all the play and options of this exciting game would take the 16 pages of instruction included.

Tape (TRS-80 16K) $34.95
Disk (TRS-80 16K, Apple 48K) $39.95

BRIDGE PARTNER

By George Duisman from Personal Software
Whether novice or expert at bridge, this program will help you practice and improve your play. You and the dummy hand play against the computer's skilled defensive hands. After a hand is played, the real learning begins: You can replay the hand to try different strategies, replay the two declarer hands against new defensive hands, rotate the hands, and more. Hands may also be saved for future use. Useful and fun.

16K tape...$19.95

SCARFMAN

From Cornsoft Group
Action-filled arcade game that pits you against the monsters. Race your Scarfman around a maze, gobbling up scoring dots. You are pursued by five monsters: if you eat a "+" they'll lower their eyes and you can eat them, otherwise they'll eat you!

With exciting graphics and sound, SCARFMAN may be played using the keyboard or Alpha Product's Joystick. WARNING: MAY BE HABIT-FORMING!

Tape...16.95
Disk (specify mod. I or III)...$20.95

LOST COLONY

By David Feitelberg from Acorn
It's the world's first deep space colony and you are the economic manager. A remarkable simulation, LOST COLONY arms you with maps and charts as tools for resource management. You assign human and robotic labor, explore new land, and set production quotas. Communicate through your model I or III using full sentences or short commands. A challenging game, it might give you insight into real life management as well.

16K protected tape or
32K protected disk...$19.95 each.

COLOR COMPUTER PROGRAMS

PACKET MAN
By Greg Zumwalt
Packet Man stands alone against three Munchkins that begin their attack from the central "Munchkin house." You must guide Packet Man with your joystick to eat all the little dots in the maze without being munched by the Munchkins. As your skill improves, so does that of the munchkins, so watch out!
Tape...$24.95

COLOR METEOROIDS
From Spectral Associates
An exciting, high resolution skill game, based on the popular "Asteroids" arcade game. "Fly" your spacecraft with the joystick, avoiding and shooting the meteoroids. Shooting large meteoroids breaks them up into smaller ones, so the screen fills in a hurry!
Tape...$21.95

COLOR SPACE INVADERS
From Spectral Associates
All the features of this classic arcade game, plus some exciting new ones: A mobile defense shield helps you fight the alien bombs, and a mystery invader from hyperspace that randomly appears and disappears. Faster and faster the aliens move and drop their bombs. Can you save Earth from their attack?
Tape...$21.95

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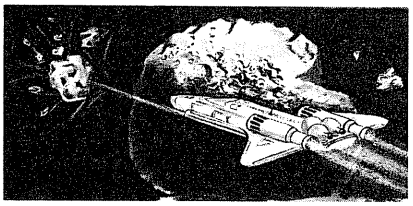


SPACE ROCKS

By Steven Kearns from Acorn
Gigantic antimatter rocks appear on the Tactical Display Screen of your spacecraft. You blast away with lasers and they just explode into smaller chunks. To score in this fast arcade game with sound, you must destroy the rocks. To stay in the game at all, you must avoid them!

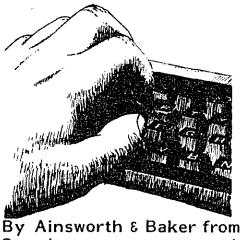
To add to your woes, time bombs appear periodically. If their timers reach zero -- BOOM! And if that's not enough, the aliens will be glad to send out some spaceships loaded with antimatter torpedoes. Fire thrusters to move, shoot laser cannon, jump to hyperspace -- anything to avoid the onslaught. One or two players can compete, with five levels of difficulty.

16K protected tape...$19.95
32K protected disk...$19.95

By John Allen from Acorn
More features, thrills, and sound than even John Allen's famous PINBALL. Once you load ASTROBALL into your TRS-80, the arrow keys become flipper buttons, the screen becomes the play board, and you become the "Pinball Wizard!"

A flying saucer, spaceships, meteors, and black holes add to the fun as your ball realistically zings around the board. ASTROBALL will have all your family and friends lining up for the pinball action and challenge. Five skill levels.

16K protected tape...$19.95
16K protected disk...$19.95

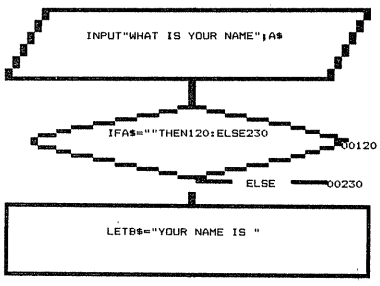


TYPING TUTOR

By Ainsworth & Baker from Microsoft
Speed up your programming and word processing with this excellent touch-typing instructional program. Divided into two sections, the program first teaches proper finger positioning. You practice keying various characters, the program adding new ones as you progress. In the practice paragraph section, you are evaluated for accuracy and rated in words per minute. The program continuously adjusts to your increasing skill, telling you which characters you miss and where you are slow. One of the most practical programs we know of for TRS-80.

Model I 16K tape...$14.95

THE DOCUMENTER



From P80NUT Software
If you would love to be able to document your programs with a flowchart but lack the time, talent, or inclination, this program is for you. THE DOCUMENTER will produce a logical flowchart directly from any suitable BASIC program and print it on the screen or most lineprinters.

You get a flowchart and branch map that will help you follow program flow and aid your debugging efforts. Even memory-filling programs can be broken down into segments and flowcharted.

16K tape...$19.95 32K tape...$19.95
48K tape...$19.95
48K tape for disk...$29.95

By Chuck Acree from Acorn
A comprehensive genealogical program. It quickly and easily sets up a data base that holds name, date and place of birth, marriage and death information, plus a comment line for each ancestor.

YOUR FAMILY TREE will display/print a complete "pedigree" for any family member; a 3-generation chart may be displayed/printed showing the number of known ancestors beyond each branch of the tree. The program will also display a U.S. outline map showing migration across the country. You get full search capabilities on any key field. Capacities: 16K tape: 45-55 ancestors. 32K tape: 175, disk: 100. 48K tape: 300, disk: 225.

16K Tape or Disk...$29.95

MONEY MANAGER

By Andrew P. Bartorillo from Acorn
A complete management tool for the home budget, it accurately keeps track of your checkbook and provides an easy method of budget allocation. You can store information on up to 100 checkbook entries per month (250 with 48K), specify any automatic withdrawals, keep records of tax-deductibles, and record expenses by category. You can even break up charge account payments into the proper categories.

32K disk...$39.95

PERSONAL PROPERTY INVENTORY

By Southern Systems from Hayden
A special database system for your personal effects. This easy to use, easy to maintain program holds ITEM, DESCRIPTION, SERIAL NUMBER, and VALUE for each item. Especially useful for insurance and tax purposes. Capacities: 16K-100 records, 32K-300 records, 48K-500 records. For more storage, you can break down items into categories (stereo, photography, etc.) and maintain separate files.

16K tape...$14.95

ACCEL 2
BASIC COMPILER

From Allen Gelder
Turns your BASIC program into a machine language/BASIC hybrid that may run many times faster. For those who plan to sell their programs, compiling by ACCEL 2 offers the additional advantage of protection: the source code and REMarks are not included in the compiled version.

While all compilers may require some modification of the BASIC program (usually because of improper structuring), we have found that ACCEL 2 requires the least, and even works with program "tricks" like string-packing, etc.

ACCEL 2 works with models I or III, requires a minimum amount of memory, supports either disk or tape (with TSAVE, optional at $9.95), and does not require extensive rewriting of your BASIC programs. Unlike other compilers, no royalty is required when selling ACCEL-compiled programs.

Supplied on tape for 16-48K...$88.95

EDIT

From Allen Gelder
A powerful utility for editing BASIC programs. Allows full-screen, word processor-type editing to save you time and frustration. This machine language program loads into upper, protected memory and is invisible until invoked from the keyboard.

EDIT uses a command structure similar to the popular SCRIPSIT word processor, so it is easy to use right away. Block and global commands are supported, so deletions, replacements and other changes to the entire program are extremely easy to do.

16-48K relocatable tape for tape or disk systems...$39.95

DISASSEMBLER

By Roy Soltoff from Misosys & Acorn
A two-pass disassembler for TRS-80 that converts machine code to Z-80 assembly language listings. DISASSEMBLER produces symbolic labels with output to video, printer or tape (or disk in version 2 only). Radio Shack's Editor/Assembler will read and load the tapes for easy modification and reassembly. Extend the capabilities of Editor/Assembler with this utility. On tape for two different memory locations.

Version 1...$14.95
Version 2...$19.95

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Posters

Create your own posters and banners

For Models I and III with printers

Charles P. Knight, Arlington, TX

Here's a program to impress your friends when you show them your new computer. With it you can make a large poster with their name in block letters, each of which is composed of smaller letters. The program requires a Level II 16K TRS-80 and an 80-column or wider line printer. I use it to make posters for my wife's ice hockey team and it's also great for pleasing the kids. Nearly everyone enjoys watching a line printer do its thing, particularly when it's drawing pictures or, in this case, large letters.

The program begins by asking if you need instructions. A reply of "Y" will fill the screen with directions for creating the poster. Any other reply will skip the instructions and request the text for the poster.

When entering text for the poster, you must be sure to surround it with quotation marks if there are commas. Failure to do this will present you with the annoying "?EXTRA IGNORED" message. Disk BASIC users may change the INPUT statement in line 80 to a LINEINPUT statement thereby eliminating the need for quotes altogether.

The input string, "A$", is tested by lines 90 through 170 to determine whether all characters entered are legal. There would be few things more annoying than printing a 10 word poster only to have the program abort somewhere in the middle, wasting all that time and paper. If there is an illegal character it will be the last one printed on the screen before the "ILLEGAL CHARACTER" message. You will be given an opportunity to enter your text again. After all, if at first you don't fricassee: fry, fry a hen! The program then prints the poster, displaying each letter on the screen as it is being created by the printer.

This is a moderately long program, taking about 7.5K to store, and it is also a bit tedious to key in. A program like "TSHORT" is a great help in this regard, however the program is quite simple to understand and follow. Lines 190 to 530 take each letter of A$ and place them into B$ which is then tested. The program then branches to the proper routine and begins printing the desired letter.

What may appear as a bug to Level II users is the fact that if the input string contains only blanks, it will abort at line 530. This is not really a bug, but occurs because the input statement in line 80 will ignore leading blanks. If you wish to use this method to advance the paper to a convenient tear off point, enclose the blanks in quotes.

While printing posters is not the most important thing you will ever do with your computer, it is impressive. You will also have something to give your friends to take home—something which will remind them that the age of the personal computer has really come into its own.

Posters Listing

```
10 REM   COPYRIGHT (C) 1980 BY
         CHARLES P. KNIGHT
         P. O. BOX 6072
         ARLINGTON, TX. 76011
20 CLEAR 1000 : DEFINT X, Y, Z : CLS
30 PRINT@ 512, "POSTER PRINTER PROGRAM
  DO YOU NEED INSTRUCTIONS?"
40 C$ = INKEY$ : IF C$ = "" THEN 40
50 IF LEFT$(C$, 1) = "Y" GOSUB 2340
60 PRINT@ 512, "ENTER THE MESSAGE YOU W
  ANT PRINTED.  BE SURE TO ENCLOSE IT I
  N
70 PRINT "QUOTATION MARKS IF IT CONTAIN
  S PUNCTUATION."
80 INPUT A$ : CLS : PRINT@ 512, ""
90 FOR X = 1 TO LEN(A$) : B$ = MID$(A$,
   X, 1) : PRINT B$; : IF B$ = CHR$(34)
   THEN NEXT X : GOTO 180
100 IF X >= LEN(A$) THEN 180
110 IF ASC(B$) > 64 AND ASC(B$) < 91 TH
  EN NEXT X : GOTO 180
120 IF B$ = "'" THEN NEXT X : GOTO 180
130 IF B$ = "," THEN NEXT X : GOTO 180
140 IF B$ = "!" THEN NEXT X : GOTO 180
150 IF B$ = "." THEN NEXT X : GOTO 180
160 IF B$ = " " THEN NEXT X : GOTO 180
170 GOTO 2410
180 NEXT X
```

```
190 CLS : PRINT@ 512, "" : FOR Z = 1 TO
   LEN(A$)
200 B$ = MID$(A$, Z, 1) : PRINT B$;
210 IF B$ = CHR$(34) THEN NEXT Z : GOTO
   60
220 IF B$ = "A" THEN 680
230 IF B$ = "B" THEN 730
240 IF B$ = "C" THEN 790
250 IF B$ = "D" THEN 830
260 IF B$ = "E" THEN 890
270 IF B$ = "F" THEN 930
280 IF B$ = "G" THEN 970
290 IF B$ = "H" THEN 1030
300 IF B$ = "I" THEN 1080
310 IF B$ = "J" THEN 1130
320 IF B$ = "K" THEN 1180
330 IF B$ = "L" THEN 1270
340 IF B$ = "M" THEN 1310
350 IF B$ = "N" THEN 1470
360 IF B$ = "O" THEN 1520
370 IF B$ = "P" THEN 1570
380 IF B$ = "Q" THEN 1620
390 IF B$ = "R" THEN 1680
400 IF B$ = "S" THEN 1740
410 IF B$ = "T" THEN 1790
420 IF B$ = "U" THEN 1840
430 IF B$ = "V" THEN 1890
440 IF B$ = "W" THEN 1980
450 IF B$ = "X" THEN 2040
460 IF B$ = "Y" THEN 2090
470 IF B$ = "Z" THEN 2290
480 IF B$ = " " THEN FOR X = 1 TO 18 :
  LPRINT "" : NEXT X : NEXT Z : GOTO 60

490 IF B$ = "!" THEN 540
500 IF B$ = "'" THEN 630
510 IF B$ = "." THEN 570
520 IF B$ = "," THEN 590
530 STOP
540 FOR X = 1 TO 8 : LPRINT "" : NEXT X

550 FOR X = 1 TO 10 : LPRINT STRING$(12
  , "!"); STRING$(12, 32); STRING$(40,
  "!") : NEXT X
560 NEXT Z : GOTO 60
570 FOR X = 1 TO 8 : LPRINT "" : NEXT X
   : FOR X = 1 TO 10 : LPRINT STRING$(1
  2, ".") : NEXT X
580 NEXT Z : GOTO 60
590 FOR X = 1 TO 8 : LPRINT "" : NEXT X

600 FOR X = 1 TO 5 : LPRINT STRING$(2,
  ","); STRING$(3, 32); STRING$(15, ","
  ) : NEXT X
610 FOR X = 1 TO 2 : LPRINT STRING$(20,
   ",") : NEXT X
```

```
620 NEXT Z : GOTO 60
630 FOR X = 1 TO 8 : LPRINT "" : NEXT X

640 FOR X = 1 TO 5 : LPRINT STRING$(43,
   32) STRING$(2, "'"); STRING$(3, 32);
   STRING$(12, "'") : NEXT X
650 FOR X = 1 TO 2 : LPRINT STRING$(43,
   32); STRING$(17, "'") : NEXT X
660 NEXT Z : GOTO 60
670 REM  ROUTINES TO PRINT OUT LETTERS
  FOLLOWS
680 FOR X = 1 TO 8 : LPRINT "" : NEXT X

690 FOR X = 1 TO 8 : LPRINT STRING$(66,
   "A") : NEXT X
700 FOR X = 1 TO 8 : LPRINT STRING$(23,
   32); STRING$(16, "A"); STRING$(11, 3
  2); STRING$(16, "A") : NEXT X
710 FOR X = 1 TO 8 : LPRINT STRING$(66,
   "A") : NEXT X
720 NEXT Z : GOTO 60 : REM
    BBBBBBBBBBBB
730 FOR X = 1 TO 8 : LPRINT "" : NEXT X

740 FOR X = 1 TO 3 : LPRINT STRING$(16,
   "B"); STRING$(34, 32); STRING$(16, "
  B") : NEXT X
750 FOR X = 1 TO 6 : LPRINT STRING$(66,
   "B") : NEXT X
760 FOR X = 1 TO 13 : LPRINT STRING$(16
  , "B"); STRING$(11, 32); STRING$(14,
  "B"); STRING$(10, 32); STRING$(15, "B
  ") : NEXT X
770 FOR X = 1 TO 6 : LPRINT STRING$(66,
   "B") : NEXT X
780 NEXT Z : GOTO 60 : REM
    CCCCCCCCCCCCC
790 FOR X = 1 TO 8 : LPRINT "" : NEXT X

800 FOR X = 1 TO 10 : LPRINT STRING$(66
  , "C") : NEXT X
810 FOR X = 1 TO 14 : LPRINT STRING$(15
  , "C"); STRING$(35, 32); STRING$(16,
  "C") : NEXT X
820 NEXT Z : GOTO 60 : REM
    DDDDDDDDDDDDD
830 FOR X = 1 TO 8 : LPRINT "" : NEXT X

840 FOR X = 1 TO 3 : LPRINT STRING$(16,
   "D"); STRING$(34, 32); STRING$(16, "
  D") : NEXT X
850 FOR X = 1 TO 6 : LPRINT STRING$(66,
   "D") : NEXT X
860 FOR X = 1 TO 13 : LPRINT STRING$(16
  , "D"); STRING$(35, 32); STRING$(15,
  "D") : NEXT X
870 FOR X = 1 TO 6 : LPRINT STRING$(66,
   "D") : NEXT X
880 NEXT Z : GOTO 60 : REM
    EEEEEEEEEEEEE
890 FOR X = 1 TO 8 : LPRINT "" : NEXT X

900 FOR X = 1 TO 9 : LPRINT STRING$(66,
   "E") : NEXT X
910 FOR X = 1 TO 13 : LPRINT STRING$(16
  , "E"); STRING$(9, 32); STRING$(16, "
  E"); STRING$(9, 32); STRING$(16, "E")
   : NEXT X
920 NEXT Z : GOTO 60 : REM
    FFFFFFFFFFFFF
930 FOR X = 1 TO 8 : LPRINT "" : NEXT X

940 FOR X = 1 TO 9 : LPRINT STRING$(66,
   "F") : NEXT X
950 FOR X = 1 TO 13 : LPRINT STRING$(25
  , 32); STRING$(16, "F"); STRING$(9, 3
  2); STRING$(16, "F") : NEXT X
960 NEXT Z : GOTO 60 : REM          GGG
  GGGGGGGGGG
970 FOR X = 1 TO 8 : LPRINT "" : NEXT X

980 FOR X = 1 TO 8 : LPRINT STRING$(66,
   "G") : NEXT X
990 FOR X = 1 TO 8 : LPRINT STRING$(15,
   "G"); STRING$(38, 32); STRING$(13, "
  G") : NEXT X
1000 FOR X = 1 TO 6 : LPRINT STRING$(15
  , "G"); STRING$(9, 32); STRING$(9, "G
  "); STRING$(20, 32); STRING$(13, "G")
   : NEXT X
1010 FOR X = 1 TO 6 : LPRINT STRING$(33
  , "G"); STRING$(20, 32); STRING$(13,
  "G") : NEXT X
1020 NEXT Z : GOTO 60 : REM
     HHHHHHHHHHHHHHH
1030 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1040 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "H") : NEXT X
1050 FOR X = 1 TO 8 : LPRINT STRING$(21
  , 32); STRING$(24, "H") : NEXT X
1060 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "H") : NEXT X
1070 NEXT Z : GOTO 60 : REM          II
  IIIIIIIIIIIII
1080 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1090 FOR X = 1 TO 5 : LPRINT STRING$(15
  , "I"); STRING$(36, 32); STRING$(15,
  "I") : NEXT X
1100 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "I") : NEXT X
```

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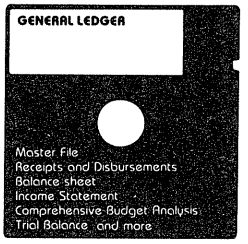

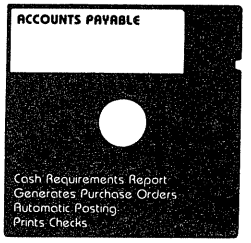

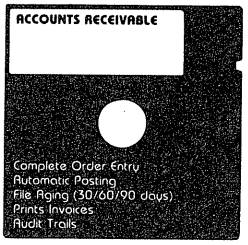

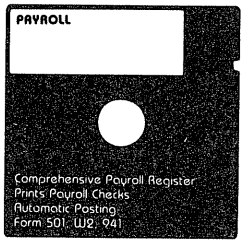

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```
1110 FOR X = 1 TO 5 : LPRINT STRING$(15
  , "I"); STRING$(36, 32); STRING$(15,
  "I") : NEXT X
1120 NEXT Z : GOTO 60 : REM
     JJJJJJJJJJJJJJ
1130 FOR X = 1 TO 8 : LPRINT : NEXT X
1140 FOR X = 1 TO 4 : LPRINT STRING$(24
  , "J") : NEXT X
1150 FOR X = 1 TO 11 : LPRINT STRING$(1
  5, "J") : NEXT X
1160 FOR X = 1 TO 6 : LPRINT STRING$(66
  , "J") : NEXT X
1170 NEXT Z : GOTO 60 : REM
     KKKKKKKKKKKKKKK
1180 Y = 0
1190 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1200 FOR X = 1 TO 5 : LPRINT STRING$(66
  , "K") : NEXT X
1210 FOR X = 1 TO 2 : LPRINT STRING$(22
  , 32) STRING$(25, "K") : NEXT X
1220 FOR X = 22 TO 1 STEP - 2
1230 Y = Y + 2
1240 LPRINT STRING$(X, 32); STRING$(11,
   "K"); STRING$(2 * Y, 32); STRING$(10
  , "K")
1250 NEXT X
1260 NEXT Z : GOTO 60 : REM
     LLLLLLLLLLLLLLLL
1270 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1280 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "L") : NEXT X
1290 FOR X = 1 TO 14 : LPRINT STRING$(1
  5, "L") : NEXT X
1300 NEXT Z : GOTO 60 : REM
     MMMMMMMMMMMMMMMM
1310 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1320 FOR X = 1 TO 6 : LPRINT STRING$(66
  , "M") : NEXT X
1330 LPRINT STRING$(43, 32); STRING$(21
  , "M")
1340 LPRINT STRING$(41, 32); STRING$(21
  , "M")
1350 LPRINT STRING$(39, 32); STRING$(21
  , "M")
1360 LPRINT STRING$(37, 32); STRING$(21
  , "M")
1370 LPRINT STRING$(35, 32); STRING$(21
  , "M")
1380 LPRINT STRING$(33, 32); STRING$(21
  , "M")
1390 LPRINT STRING$(33, 32); STRING$(21
  , "M")
1400 LPRINT STRING$(35, 32); STRING$(21
  , "M")
1410 LPRINT STRING$(37, 32); STRING$(21
  , "M")
1420 LPRINT STRING$(39, 32); STRING$(21
  , "M")
1430 LPRINT STRING$(41, 32); STRING$(21
  , "M")
1440 LPRINT STRING$(43, 32); STRING$(21
  , "M")
1450 FOR X = 1 TO 6 : LPRINT STRING$(66
  , "M") : NEXT X
1460 NEXT Z : GOTO 60 : REM
     NNNNNNNNNNNNNNNN
1470 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1480 FOR X = 1 TO 6 : LPRINT STRING$(66
  , "N") : NEXT X
1490 FOR X = 53 TO 0 STEP - 3 : LPRINT
  STRING$(X, 32) STRING$(13, "N") : NEX
  T X
1500 FOR X = 1 TO 6 : LPRINT STRING$(66
  , "N") : NEXT X
1510 NEXT Z : GOTO 60 : REM
     OOOOOOOOOOOOOOOO
1520 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1530 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "O") : NEXT X
1540 FOR X = 1 TO 14 : LPRINT STRING$(1
  5, "O"); STRING$(35, 32); STRING$(16,
   "O") : NEXT X
1550 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "O") : NEXT X
1560 NEXT Z : GOTO 60 : REM
        PPPPPPPPPP
1570 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1580 FOR X = 1 TO 9 : LPRINT STRING$(66
  , "P") : NEXT X
1590 FOR X = 1 TO 10 : LPRINT STRING$(2
  5, 32); STRING$(16, "P"); STRING$(9,
  32); STRING$(16, "P") : NEXT X
1600 FOR X = 1 TO 8 : LPRINT STRING$(25
  , 32); STRING$(41, "P") : NEXT X
1610 NEXT Z : GOTO 60 : REM
     QQQQQQQQQQQQQQQQ
1620 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1630 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "Q") : NEXT X
1640 FOR X = 1 TO 10 : LPRINT STRING$(1
  5, "Q"); STRING$(35, 32); STRING$(16,
   "Q") : NEXT X
1650 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "Q") : NEXT X
1660 FOR X = 1 TO 5 : LPRINT STRING$(15
  , "Q") : NEXT X
```

```
1670 NEXT Z : GOTO 60 : REM
     RRRRRRRRRRRRRRRR
1680 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1690 FOR X = 1 TO 6 : LPRINT STRING$(66
  , "R") : NEXT X
1700 FOR X = 1 TO 6 : LPRINT STRING$(23
  , 32); STRING$(16, "R"); STRING$(12,
  32); STRING$(15, "R") : NEXT X
1710 FOR X = 1 TO 6 : LPRINT STRING$(39
  , "R"); STRING$(12, 32); STRING$(15,
  "R") : NEXT X
1720 FOR X = 1 TO 6 : LPRINT STRING$(23
  , 32); STRING$(43, "R") : NEXT X
1730 NEXT Z : GOTO 60 : REM
     SSSSSSSSSSSSSSSS
1740 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1750 FOR X = 1 TO 6 : LPRINT STRING$(15
  , "S"); STRING$(12, 32); STRING$(39,
  "S") : NEXT X
1760 FOR X = 1 TO 10 : LPRINT STRING$(1
  5, "S"); STRING$(12, 32); STRING$(14,
   "S"); STRING$(12, 32); STRING$(13, "
  S") : NEXT X
1770 FOR X = 1 TO 6 : LPRINT STRING$(41
  , "S"); STRING$(12, 32); STRING$(13,
  "S") : NEXT X
1780 NEXT Z : GOTO 60 : REM
     TTTTTTTTTTTTTTTTTT
1790 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1800 FOR X = 1 TO 8 : LPRINT STRING$(50
  , 32); STRING$(16, "T") : NEXT X
1810 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "T") : NEXT X
1820 FOR X = 1 TO 8 : LPRINT STRING$(50
  , 32); STRING$(16, "T") : NEXT X
1830 NEXT Z : GOTO 60 : REM
     UUUUUUUUUUUUUUUUUU
1840 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1850 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "U") : NEXT X
1860 FOR X = 1 TO 12 : LPRINT STRING$(1
  5, "U") : NEXT X
1870 FOR X = 1 TO 8 : LPRINT STRING$(66
  , "U") : NEXT X
1880 NEXT Z : GOTO 60 : REM
     VVVVVVVVVVVVVVVVVV
1890 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1900 FOR X = 49 TO 0 STEP - 4
1910 LPRINT STRING$(X, 32); STRING$(17,
   "V")
```

```
1920 NEXT X
1930 LPRINT STRING$(17, "V")
1940 FOR X = 1 TO 49 STEP 3
1950 LPRINT STRING$(X, 32); STRING$(17,
   "V")
1960 NEXT X
1970 NEXT Z : GOTO 60 : REM
     WWWWWWWWWWWWWWWWWW
1980 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
1990 FOR X = 1 TO 6 : LPRINT STRING$(66
  , "W") : NEXT X
2000 FOR X = 1 TO 11 STEP 2 : LPRINT ST
  RING$(X, 32); STRING$(21, "W") : NEXT
   X
2010 FOR X = 11 TO 1 STEP - 2 : LPRINT
  STRING$(X, 32); STRING$(21, "W") : NE
  XT X
2020 FOR X = 1 TO 6 : LPRINT STRING$(66
  , "W") : NEXT X
2030 NEXT Z : GOTO 60 : REM
     XXXXXXXXXXXXXXXXX
2040 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
2050 FOR X = 0 TO 22 STEP 2 : LPRINT ST
  RING$(X, 32); STRING$(13, "X"); STRIN
  G$(44 -(2 * X), 32); STRING$(13, "X")
   : NEXT X
2060 LPRINT STRING$(23, 32); STRING$(23
  , "X")
2070 FOR X = 22 TO 0 STEP - 2 : LPRINT
  STRING$(X, 32); STRING$(13, "X"); STR
  ING$(44 -(2 * X), 32); STRING$(13, "X
  ") : NEXT X
2080 NEXT Z : GOTO 60 : REM
      YYYYYYYYYYYYYYYYY
2090 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
2100 LPRINT STRING$(56, 32); STRING$(10
  , "Y")
2110 LPRINT STRING$(52, 32); STRING$(11
  , "Y")
2120 LPRINT STRING$(48, 32); STRING$(11
  , "Y")
2130 LPRINT STRING$(44, 32); STRING$(11
  , "Y")
2140 LPRINT STRING$(40, 32); STRING$(11
  , "Y")
2150 LPRINT STRING$(36, 32); STRING$(11
  , "Y")
2160 LPRINT STRING$(32, 32); STRING$(11
  , "Y")
2170 LPRINT STRING$(28, 32); STRING$(11
  , "Y")
2180 FOR X = 1 TO 4 : LPRINT STRING$(38
   - X, "Y") : NEXT X
2190 FOR X = 4 TO 1 STEP - 1 : LPRINT S
  TRING$(38 - X, "Y") : NEXT X
2200 LPRINT STRING$(28, 32); STRING$(11
  , "Y")
2210 LPRINT STRING$(32, 32); STRING$(11
  , "Y")
2220 LPRINT STRING$(36, 32); STRING$(11
  , "Y")
2230 LPRINT STRING$(40, 32); STRING$(11
  , "Y")
2240 LPRINT STRING$(44, 32); STRING$(11
  , "Y")
2250 LPRINT STRING$(48, 32); STRING$(11
  , "Y")
2260 LPRINT STRING$(52, 32); STRING$(11
  , "Y")
2270 LPRINT STRING$(56, 32); STRING$(10
  , "Y")
2280 NEXT Z : GOTO 60 : REM
     ZZZZZZZZZZZZZZZZZZZ
2290 FOR X = 1 TO 8 : LPRINT "" : NEXT
  X
2300 FOR X = 1 TO 2 : LPRINT STRING$(20
  , "Z"); STRING$(36, 32); STRING$(10,
  "Z") : NEXT X
2310 FOR X = 0 TO 36 STEP 2 : LPRINT ST
  RING$(10, "Z"); STRING$(X, 32); STRIN
  G$(10, "Z"); STRING$(36 - X, 32); STR
  ING$(10, "Z") : NEXT X
2320 FOR X = 1 TO 2 : LPRINT STRING$(10
  , "Z"); STRING$(36, 32); STRING$(20,
  "Z") : NEXT X
2330 NEXT Z : GOTO 60
2340 CLS : PRINT : PRINT "THIS PROGRAM
  ALLOWS YOU TO PRINT A MESSAGE OF UP T
  O 255
2350 PRINT "CHARACTERS IN LARGE BLOCK L
  ETTERS ON YOUR LINE PRINTER.
2360 PRINT "ONLY UPPER CASE LETTERS AND
  :
        .   PERIOD
        ,   COMMA
        !   EXCLAMATION POINT
        '   APOSTROPHE
ARE ALLOWED.
2370 PRINT : PRINT "IF YOU USE THE COMM
  A, THEN THE ENTIRE
2380 PRINT "MESSAGE MUST BE ENCLOSED IN
   QUOTES.
2390 PRINT : PRINT : INPUT "PRESS <ENTE
  R> TO CONTINUE....................."; A
  $
2400 CLS : RETURN
2410 PRINT : PRINT "ILLEGAL CHARACTER.
   TRY AGAIN" : FOR X = 1 TO 1000 : NEX
  T X : GOTO 60 ■
```

Even if you have one of the other versions on the market, you'll still consider this program a MUST for your collection.

SPACE

10940

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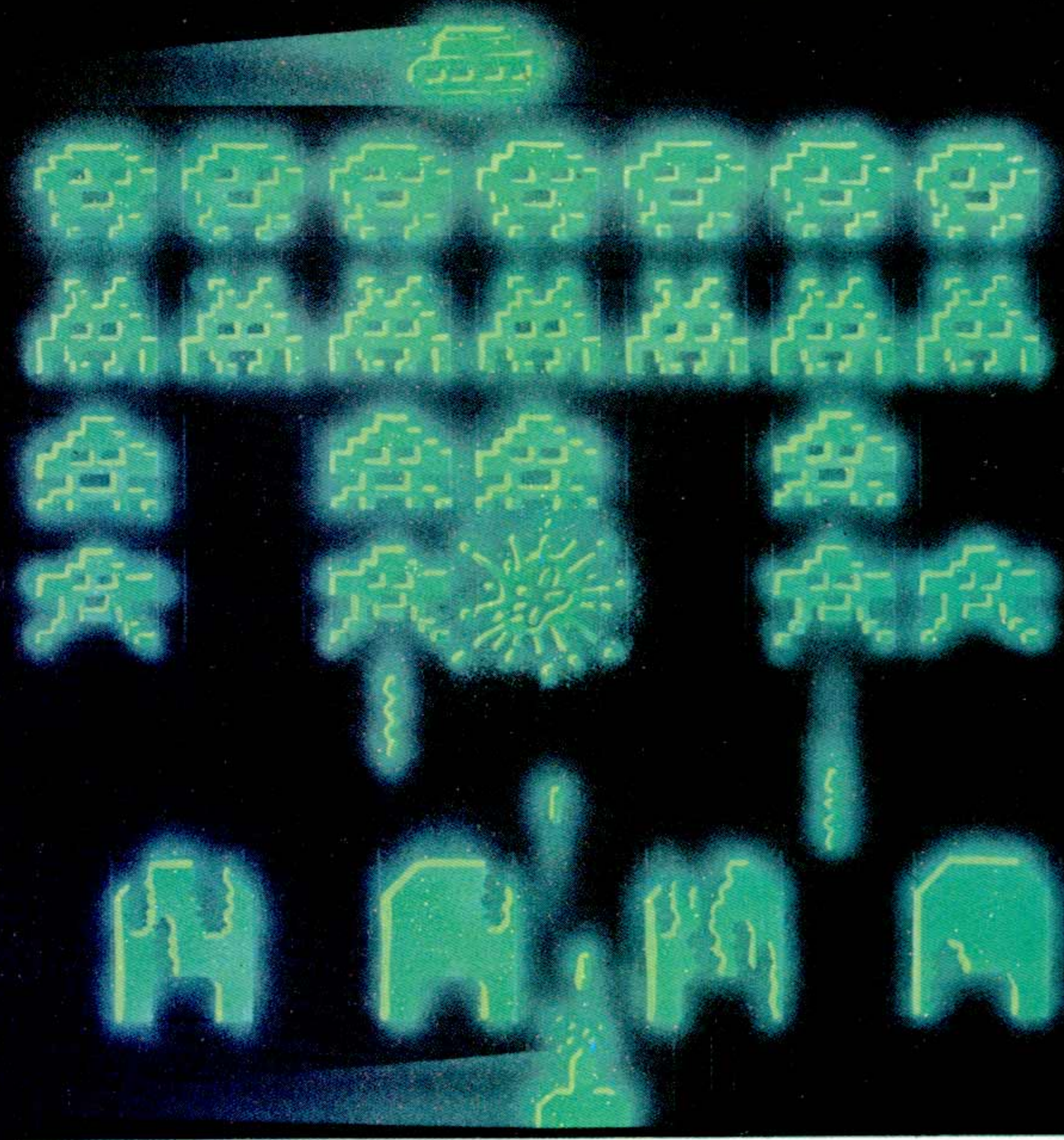

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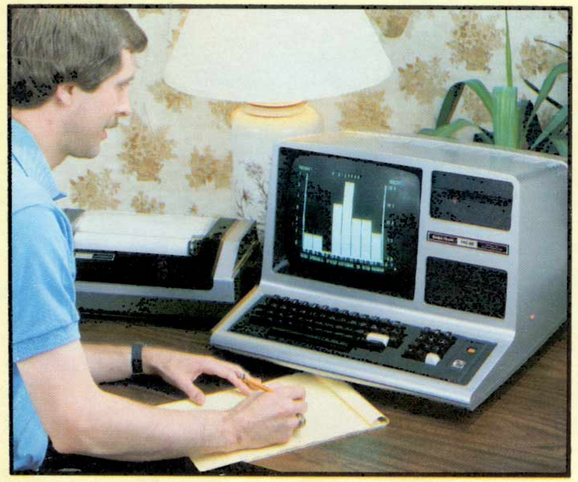

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Criss-cross

A checkers type game

For Color Computer

John Sinclair, Salt Lake City, UT

Here's a fast, fun, text-based game for one or two players. Letters play against numbers in a lively grid-type competition. There are no special graphics, but they will not be missed as you race your competitor across the board for a win. If you want to go solo, your computer will play against you with fierce determination.

Criss-Cross can be as simple as the youngest child playing, but there is room to develop some serious strategy. At the start, the players determine the size of the grid and which pieces each will move. Enter the piece to move with a keyboard input and the direction to move with one of the four arrow keys. Game rules will not allow diagonal moves or jumps. Don't block your opponent so he cannot move at all or you will lose by default!

If a player is blocked out, or thinks he has been, he should just strike the spacebar. The program will scan the current player's pieces and if there is no legal move left to the player, the game goes to him. However, if there are moves left, the piece will be highlighted and play may continue by again striking the spacebar.

Since the game loads in more than the memory available at power up, you will need to do a "PCLEAR 1" then a "CLOAD" and "RUN". Otherwise, the out-of-memory error will pop up.

The range of five to seven pieces in play is a better game when opposing the computer. Three to five pieces are quick and challenging. The bit grids are slow for the computer to play since it has to sift all its pieces to find priority moves. Human players will enjoy competing on any size game board.

Behind the Program

First in the program, we jump to the title page and instructions in lines 3100 on. Then we go back to the start of the main program loop (line 750) to gather three inputs. The computer finds out if it will be a competitor when the number of players are entered. Next, you tell it how many pieces each side will be using. Finally, you tell it who will move first. When going against the computer, the human player will always have the first move and his choice of letters or numbers for game pieces.

The program builds a three-dimensional array in lines 920-1220. The first level holds the pieces in play and the second level holds the screen's "PRINT @" positions. Each time a move is entered, the piece is sifted out of the array by the subroutine at line 180. After each completed move, both *home* areas are checked. If either is full then a winner is announced and a new game is offered.

Subroutines are placed at the beginning of the program to cut down program time used to search for them. Instructions used only once or seldom are toward the end of the program. ■

I can provide copies for readers who do not want to type the program in (Color computer only). Please do not send a cassette as I use Microsette Data Tapes for reliability. I mail first class promptly for a $4.00 fee. John Sinclair, 1234 Alameda Ave. #1, Salt Lake City, UT 84102.

```
1340 IF NM$=N$ THEN 1370
1350 IF P<65 OR P>64+PP THEN SOU
ND 69,3:GOTO 1310
1360 GOTO 1380
1370 IF P<49 OR P>48+PP THEN 131
0
1380 PRINT@ 52,P$
1390 SOUND 240,1
1400 GOSUB 180
1410 IF Z=P THEN 1430
1420 SOUND 69,3:PRINT@ 52," ";:G
OTO 1310
1430 PRINT@ 72, "DIRECTION ?"
1440 SOUND 150,2
1450 D$=INKEY$:IF D$=""THEN 1450
1460 D=ASC(D$)
1470 IF D=32 THEN 2700
1480 IF NM$=N$ THEN 1510
1490 IF D=10 THEN SOUND 69,3:GOT
01450
1500 GOTO 1520
1510 IF D=8 THEN SOUND 69,3:GOTO
 1450
1520 IF D=8 AND YY>0 THEN 1570
1530 IF D=9 THEN 1580
1540 IF D=10 AND XX>0 THEN 1590
1550 IF D=94 THEN 1600
1560 SOUND 69,3:GOTO1430
1570 Y=YY-1:Z$="LEFT":X=XX: GOTO
 1610
1580 Y=YY+1:Z$="RIGHT":X=XX:GOTO
 1610
1590 X=XX-1:Z$="DOWN":Y=YY: GOTO
 1610
1600 X=XX+1:Z$="UP":Y=YY
1610 IF NM$=N$ THEN 1640
1620 IF AA(X,Y,0)=175 THEN 1660
1630 GOTO 1650
1640 IF AA(X,Y,0)=159 THEN 1660
1650 IF AA(X,Y,0)<>0 THEN SOUND
69,3:FOR T=96 TO 32 STEP -1:PRIN
T@ T," ";:NEXT T:GOTO  1290
1660 GOSUB 280
1670 GOSUB 420
1680 IF NM$=N$ THEN NM$=L$ ELSE
NM$=N$
1690 FOR T=0 TO96
1700 PRINT@ T," ";
1710 NEXT T
1720 IF NP=2 THEN 1280
1730 PRINT@ 2,"COMPUTER MOVES ";
NM$;"..."
1740 PRINT@ 43,LEFT$(NM$,6);" -"
1750 SOUND 150,2
1760 IF NM$=N$ THEN 2170
1770 '
1780 '
1790 '>> COMPUTER MOVES LETTERS
1800 '
1810 P=P+17:IF P>64+PP THEN P=65
1820 CT=0
1830 GOSUB 180
1840 IF XX+1<=(PP+1) THEN UP=AA(
XX+1,YY,0) ELSE 1860
1850 IF UP=175 OR UP=0 THEN X=XX
+1:Y=YY:Z$="UP":GOTO 2540
1860 P=P+1:IF P>64+PP THEN P=65
1870 CT=CT+1:IF CT=PP+1 THEN CT=
0:GOTO 1890
1880 GOTO 1830
1890 GOSUB 180
1900 FOR YR=YY TO PP+1
1910 IF XX<=PP THEN LR=AA(XX+1,Y
R,0)
1920 IF LR=0 THEN LR=175
1930 NEXT YR
1940 IF YY+1<PP+1 THEN RT=AA(XX,
YY+1,0) ELSE 1960
1950 IF LR=175 AND RT=0 THEN Y=Y
Y+1:X=XX:Z$="RIGHT":GOTO 2540
1960 FOR YL=YY TO 1 STEP-1
1970 IF XX+1<=PP+1 THEN LL=AA(XX
+1,YL,0)
1980 IF LL=0 THEN LL=175
1990 NEXT YL
2000 IF YY-1>=1 THEN LF=AA(XX,YY
-1,0) ELSE 2020
2010 IF LL=175 AND LF=0 THEN Y=Y
Y-1:X=XX:Z$="LEFT":GOTO 2540
2020 P=P+1:IF P>64+PP THEN P=65
2030 CT=CT+1:IF CT=PP+1 THEN 205
0
2040 GOTO 1890
2050 FOR P=65 TO 64+PP
2060 GOSUB 180
2070 IF YY<=PP THEN RT=AA(XX,YY+
1,0) ELSE 2090
2080 IF RT=0 THEN Y=YY+1:X=XX:Z$
="RIGHT":GOTO 2540
2090 IF YY-1>=1 THEN LF=AA(XX,YY
-1,0) ELSE 2110
2100 IF LF=0 THEN Y=YY-1:X=XX:Z$
="LEFT":GOTO 2540
2110 NEXT P
2120 GOTO 2480
2130 '
2140 '
2150 '>> COMPUTER MOVES NUMBERS
2160 '
2170 P=P-15:IF P>48+PP THEN P=49
2180 CT=0
2190 GOSUB 180
2200 IF YY+1<=PP+1 THEN RT=AA(XX
,YY+1,0) ELSE 2220
2210 IF RT=159 OR RT=0 THEN Y=YY
+1:X=XX:Z$="RIGHT":GOTO 2540
2220 P=P+1:IF P>48+PP THEN P=49
2230 CT=CT+1:IF CT=PP+1 THEN CT=
0:GOTO 2250
2240 GOTO 2190
2250 GOSUB 180
2260 FOR XU=XX TO PP+1
2270 IF YY<=PP AND XX<=PP THEN L
U=AA(XU,YY+1,0)
2280 IF LU=0 THEN LU=159
2290 NEXT XU
2300 IF XX+1<PP+1 THEN UP=AA(XX+
1,YY,0) ELSE 2320
2310 IF LU=159 AND UP=0 THEN X=X
X+1:Y=YY:Z$="UP":GOTO 2540
2320 FOR XD=XX TO 1 STEP-1
2330 IF YY+1<=PP+1 AND XX>=1 THE
N LD=AA(XD,YY+1,0)
2340 IF LD=0 THEN LD=159
2350 NEXT XD
2360 IF XX-1>=1 THEN DN=AA(XX-1,
YY,0) ELSE 2380
2370 IF LD=159 AND DN=0 THEN X=X
X-1:Y=YY:Z$="DOWN":GOTO 2540
2380 P=P+1:IF P>48+PP THEN P=49
2390 CT=CT+1:IF CT=PP+1 THEN 241
0
2400 GOTO 2250
2410 FOR P=49 TO 48+PP
2420 GOSUB 180
2430 IF XX<=PP THEN UP=AA(XX+1,Y
Y,0) ELSE 2450
2440 IF UP=0 THEN X=XX+1:Y=YY:Z$
="UP":GOTO 2540
2450 IF XX-1=>1 THEN DN=AA(XX-1,
YY,0) ELSE 2470
2460 IF DN=0 THEN X=XX-1:Y=YY:Z$
="DOWN":GOTO 2540
2470 NEXT P
2480 FOR T=0 TO 95:PRINT@ T," ";
:NEXT T
2490 PRINT@ 3,"NO LEGAL MOVES FO
R ";NM$
2500 FOR T=1 TO 5
2510 SOUND 69,3:SOUND 50,3
2520 NEXT T
2530 W$=NM$:GOTO 610
2540 PRINT@ 52,CHR$(AA(XX,YY,0))
2550 SOUND 240,1
2560 PRINT@ 72,"DIRECTION -"
2570 SOUND 150,2
2580 GOSUB 280
2590 GOSUB 420
2600 IF NM$=N$ THEN NM$=L$ ELSE
NM$=N$
2610 FOR T=0 TO 95
2620 PRINT@ T," ";
2630 NEXT T
2640 GOTO 1280
2650 '
2660 ' >> CLOSE MAIN LOOP <<
2670 '
2680 ' >> LOOK FOR BLOCK <<
2690 '
2700 IF NM$=N$ THEN 2810
2710 FOR P=65 TO 64+PP
2720 GOSUB 180
2730 IF XX+1<=PP+1 THEN UP=AA(XX
+1,YY,0) ELSE 2750
2740 IF UP=175 OR UP=0 THEN 2910
2750 IF YY+1<PP+1 THEN RT=AA(XX,
YY+1,0) ELSE 2770
2760 IF RT=0 THEN 2910
2770 IF YY-1>=0 THEN LF=AA(XX,YY
-1,0) ELSE 2790
2780 IF LF=0 THEN 2910
2790 NEXT P
2800 GOTO 3000
2810 FOR P=49 TO 48+PP
2820 GOSUB 180
2830 IF YY+1<=PP+1 THEN RT=AA(XX
,YY+1,0) ELSE 2850
2840 IF RT=159 OR RT=0 THEN 2910
2850 IF XX+1<PP+1 THEN UP=AA(XX+
1,YY,0) ELSE 2870
2860 IF UP=0 THEN 2910
2870 IF XX-1>=0 THEN DN=AA(XX-1,
YY,0) ELSE 2890
2880 IF DN=0 THEN 2910
2890 NEXT P
2900 GOTO 3000
2910 PRINT@ AA(XX,YY,1), CHR$(12
8);
2920 FOR T=1 TO 50:NEXT T
2930 PRINT@ AA(XX,YY,1), CHR$(AA
```

Listing for Criss-Cross 16K Extended Color BASIC Only

```
0 ' FILE NAME "CROSS-UP"
1 '
2 ' ***************************
3 ' *       CRISS-CROSS       *
4 ' *     FOR TRS-80 COLOR    *
5 ' ***************************
6 '  BY   JOHN SINCLAIR
7 '       1234 ALAMEDA AVE.
8 '       SALT LAKE CITY
9 '       UTAH       84102
10 '
11 ' >> VARIABLES & ARRAYS <<
12 '
13 ' A$ - DUMMY (TEMPORARY USE)
14 ' AN$- ANSWER (USER INPUT)
15 ' NM$- NAME OF CURRENT PLAYER
16 ' N$ - "NUMBERS"
17 ' L$ - "LETTERS"
18 ' NP - NO. OF PLAYERS (INPUT)
19 ' PP - NO. OF PIECES (INPUT)
20 '       (GRID SIZE)
21 ' AA - MAIN MAT. ARRAY (3-D)
22 '   (X,Y,0)-DISPLAYED PIECE
23 '   (X,Y,1)-'PRINT@' LOCATION
24 ' P  - PIECE IN MOTION
25 ' D  - DIRECTION OF MOVE
26 ' X,XX,Y,YY - COORDINATES
27 ' R,S,T,Z,CT- LOOP COUNTERS
28 '
29 ' 16K / EXTENDED COLOR BASIC
30 '
100 CLS
110 CLEAR
120 PCLEAR 1
130 GOTO 3100
140 '
150 '
160 ' >> SUB TO SIFT ARRAY <<
170 '
180 FOR XX=0 TO PP
190 FOR YY=0 TO PP
200 Z=AA(XX,YY,0)
210 IF Z=P THEN GOTO 230
220 NEXT YY:NEXT XX
230 RETURN
240 '
250 '
260 ' >> SUB TO PRINT MOVES <<
270 '
280 PRINT@ 84,Z$
290 SOUND 240,1
300 IF AA(X,Y,0)=159 THEN SOUND
200,3
310 IF AA(X,Y,0)=175 THEN SOUND
200,3
320 AA(X,Y,0)=AA(XX,YY,0)
330 PRINT@ AA(X,Y,1),CHR$(AA(XX,
YY,0));
340 SOUND 190,2
350 AA(XX,YY,0)=0
360 PRINT@ AA(XX,YY,1),CHR$(43);
370 SOUND 210,1:RETURN
380 '
390 '
400 ' >> SUB TO LOOK FOR WIN <<
410 '
420 SN=0:SL=0
430 FOR R=1 TO PP
440 IF AA(PP+1,R,0)=175 THEN SL=
1
450 IF AA(R,PP+1,0)=159 THEN SN=
1
460 NEXT R
470 IF SN=0 THEN W$=N$:GOSUB 540
480 IF SL=0 THEN W$=L$:GOSUB 540
490 RETURN
500 '
510 '
520 '>> SUB SHOW WIN & GO AGAIN
530 '
540 FOR T=0 TO 96
550 PRINT@ T," ";
560 NEXT T
570 FOR T=1 TO 10
580 SOUND 200,1
590 SOUND 190,1
600 NEXT T
610 PRINT@ 40,W$;" WINS !!"
620 SOUND 200,2:SOUND 230,2:SOUN
D 185,3
630 FOR T=1 TO 300:NEXT T
640 PRINT@ 70,"GO AGAIN (Y OR N)
 ??"
650 SOUND 150,2
660 A$=INKEY$
670 AN$=INKEY$:IF AN$=""THEN 670
680 IF AN$="Y" THEN 3260
690 PRINT@ 96,"end";:END
700 '
710 '
720 ' >> MAIN PROGRAM LOOP <<
730 ' >> INPUTS & BUILD ARRAY <<
740 '
750 PRINT@ 64,;:INPUT " FIRST, H
OW MANY PLAYERS ...      (1 OR 2)
  ";NP$
760 NP=VAL(NP$)
770 IF NP<1 OR NP>2 THEN SOUND 6
9,3:GOTO 750
780 SOUND 240,1
790 PRINT@ 192,;:INPUT " NEXT, S
ELECT THE NUMBER OF      PIECES
YOU WANT IN PLAY...      (ANY NU
MBER FROM 3 TO 9)  ";PP$
800 PP=VAL(PP$):PP=INT(PP)
810 IF PP<3 OR PP>9 THEN SOUND 6
9,3:GOTO 790
820 SOUND 240,1
830 IF NP=2 THEN 860
840 PRINT@ 352,;:INPUT " FINALLY
, DO YOU WANT 'LETTERS'  OR 'NUM
BERS' (L OR N)  ";AN$
850 GOTO 870
860 PRINT@ 352,;:INPUT " FINALLY
, WHO WILL MOVE FIRST -  'LETTER
S' OR 'NUMBERS' ...      (L OR N
)   ";AN$
870 IF AN$<>"N" AND AN$<>"L" THE
N SOUND 69,3:GOTO 830
880 SOUND 240,1
890 N$="NUMBERS":L$="LETTERS"
900 IF AN$="L" THEN NM$=L$
910 IF AN$="N" THEN NM$=N$
920 DIM AA(PP+1,PP+1,1)
930 AA(0,0,0)=32:AA(0,PP+1,0)=32
:AA(PP+1,0,0)=32:AA(PP+1,PP+1,0)
=32
940 XY=176+31*(PP+1)
950 AA(0,0,1)=XY
960 XY=XY+32
970 FOR R=0 TO PP+1
980 XY=XY-32
990 FOR S=0 TO PP+1
1000 AA(R,S,1)=XY+S*2
1010 NEXT S:NEXT R
1020 FOR T=1 TO PP
1030 AA(0,T,0)=T+64
1040 AA(T,0,0)=T+48
1050 AA(T,PP+1,0)=159
1060 AA(PP+1,T,0)=175
1070 NEXT T
1080 CLS
1090 FOR X=0 TO PP
1100 FOR Y=0 TO PP+1
1110 PRINT@ AA(X,Y,1),CHR$(AA(X,
Y,0));
1120 IF AA(X,Y,0)=0 THEN PRINT@
AA(X,Y,1),CHR$(43);
1130 NEXT Y
1140 SOUND X*9+100,1
1150 NEXT X
1160 FOR Z=1 TO PP
1170 PRINT@ AA(PP+1,Z,1),CHR$(17
5);CHR$(175);
1180 NEXT Z
1190 FOR S=1 TO PP
1200 SOUND Z*10+100,1
1210 NEXT S
1220 PRINT@ AA(PP+1,PP+1,1), CHR
$(AA(PP+1,PP+1,0));
1230 '
1240 '
1250 ' >> GET MOVE - HUMANS <<
1260 ' >> CHECK FOR ILLEGAL <<
1270 '
1280 PRINT@ 2,NM$;", YOUR MOVE..
."
1290 PRINT@ 37,"WHICH ";LEFT$(NM
$,6);" ?"
1300 SOUND 150,2
1310 P$=INKEY$:IF P$=""THEN 1310
1320 P=ASC(P$)
1330 IF P=32 THEN 2700
```

```
(XX,YY,0));
2940 FOR T=1 TO 50
2950 A$=INKEY$:IF A$=""THEN 2970
2960 IF ASC(A$)=32 THEN 2990
2970 NEXT T
2980 GOTO 2910
2990 GOTO 1280
3000 FOR T=0 TO 95:PRINT@ T," ";
:NEXT T
3010 PRINT@ 3,"NO LEGAL MOVES FO
R ";NM$
3020 FOR T=1 TO 5
3030 SOUND 69,3:SOUND 50,3
3040 NEXT T
3050 W$=NM$:GOTO 570
3060 '
3070 '
3080 ' >> OPENING & INSTRUCTIONS
3090 '
3100 A$="C R I S S * C R O S S"
3110 CLS:FOR T=1 TO 300:NEXT T
3120 FOR S=1 TO 21 STEP 2
3130 PRINT@ 228+S,MID$(A$,S,1);
3140 SOUND 50+(9*S),1
3150 NEXT S
3160 FOR T=1 TO 300:NEXT T
3170 FOR S=1 TO 32
3180 A=RND(70)*2+30
3190 B=RND(70)*2+290
3200 PRINT@A,CHR$(43);
3210 SOUND A,1
3220 PRINT@B,CHR$(43);
3230 SOUND B-290,1
3240 NEXT S
3250 FOR T=1 TO 700:NEXT T
3260 CLS
3270 PRINT@ 32*5, " NEED INSTRUC
TIONS (Y OR N)...?"
3280 SOUND 150,2
3290 A$=INKEY$
3300 AN$=INKEY$:IF AN$=""THEN 33
00
3310 PRINT@ 32*6+15, AN$
3320 SOUND 2.5*ASC(AN$),1
3330 FOR T=1 TO 300:NEXT T
3340 IF AN$="N" THEN 3510
3350 CLS
3360 PRINT:PRINT " IN THIS GAME,
 YOU TRY TO GET     ALL YOUR PIEC
ES ACROSS THE       BOARD AND INT
O THE 'HOME' AREA   FIRST. YOU MA
Y MOVE IN ANY       DIRECTION EXC
EPT TOWARD YOUR     STARTING PLAC
E."
3370 PRINT:PRINT " ONE PLAYER GE
TS 'LETTERS' AND    THE OTHER GET
S 'NUMBERS'. YOU    MAY CHOOSE WH
ICH YOU WANT. TWO   PERSONS MAY P
LAY, OR ONE CAN     OPPOSE THE CO
MPUTER."
3380 PRINT:PRINT "      PRESS ent
er TO CONTINUE"
3390 A$=INKEY$
3400 AN$=INKEY$:IF AN$=""THEN 34
00
3410 IF ASC(AN$)<>13 THEN 3400
3420 SOUND 242,1:CLS
3430 PRINT:PRINT TAB(10) "LEGAL
MOVES"
3440 PRINT
3450 PRINT " * ANY DIRECTION EXC
EPT TOWARD        YOUR STARTING LIN
E               * NO DIAGONAL MOVES
                * NO JUMPS"
3460 PRINT " * IF YOU BLOCK YOUR
 OPPONENT         SO HE HAS NO LEGA
L MOVES,          YOU LOSE !
                * PRESS THE SPACE B
AR IF YOU         ARE BLOCKED
                * YOU MUST EXIT THE
 'HOME'           OPPOSITE YOUR STA
RTING LINE"
3470 PRINT:PRINT TAB(7) "PRESS e
nter TO PLAY";
3480 A$=INKEY$
3490 AN$=INKEY$:IF AN$=""THEN 34
90
3500 IF ASC(AN$)<>13 THEN 3490
3510 SOUND 242,1:CLS:CLEAR
3520 GOTO 750 ■
```

Basically BASIC

All about arrays

For all models

T. R. Dettmann, associate editor

It's not just that arrays are unfamiliar—somehow my students feel that arrays are inherently difficult to learn to use. In teaching programming at several levels and in several languages, almost invariably I find that students are reluctant to work with arrays until I can show how really useful they are.

In fact, arrays are just another form of variable that's available on the computer. They allow us to perform certain functions very efficiently. There is so much to be done with arrays that they become a major part of most programs. Before talking about how to use arrays, let's look at just what they are in the computer.

How arrays work

Let's start with variables in general. When we create a variable in memory, what we are really doing is setting aside a cubbyhole in memory into which we will put something. We're telling the computer to call that cubbyhole by a name, the variable name.

Purists and computer experts will insist on noting that an integer variable creates a two byte number, a real variable 4 bytes, a double precision eight bytes, and a string one byte per character. For this example, just imagine that all the cubbyholes are the same and that there is something which allows you to tell one from another.

Once we've created a variable in memory, we store numbers in that place by setting the variable name equal to some number:

A=5, stores 5 in cubbyhole "A"

B=5*A, stores 5*5 in cubbyhole "B"

By this very simple technique, programs may be written in terms of variable names. Let the computer worry about where it's going to put the numbers.

This situation is fine for simple programs when using very simple variables. How can we handle situations where we have more than one of the same thing? Say, for instance, we want to be able to get out the number of days in a month given the month number. We could do it like this:

```
10 INPUT "MONTH NUMBER";M
20 IF M=1 THEN D=31
30 IF M=2 THEN D=28
40 IF M=3 THEN D=30
```

That kind of program is time consuming to write and not very efficient. There's a better way.

Let's go back to our picture of memory as a series of cubbyholes for variables. Take the variable D and instead of storing just one number there, store all 12 numbers. In other words, cubbyhole D will have 31 for the number of days in January, cubbyhole D+1 will have 28 days in February, D+2 will have 31 for March, D+3 will have 30 for April.

Now that these numbers are in memory, all starting at memory cubbyhole "D", we want a simple way to find them. This simple way is the array.

An array starts at the named cubbyhole (in this case "D") and uses an index to find the number requested. By convention, in BASIC the first cubbyhole in any array has an index of zero. The number of days in January is the number stored in array D index zero. We write this as D(0).

The parentheses are used to tell an array from a regular variable of the same name and to set off the index. The index may be any number. It may even be a variable or a computed expression.

In our present scheme, if requesting the number of days in December, ask for D(11); October is D(9), and so on. Now we can rewrite our program to give the number of days in a month like this:

```
10 INPUT "MONTH NUMBER";M
20 PRINT D(M-1)
```

Before this could run in a computer though, we must create the array and stuff the numbers into it.

Creating arrays

As with other variables in BASIC, arrays are created automatically by the interpreter while a program is running. There is a definite limit to how smart the interpreter may be.

BASIC creates space for 11 numbers (indexes zero through 10) for the array. This is fine for small arrays, but many problems need more than 10 spaces like our days in a month example. To satisfy this requirement, there is a statement called DIMension.

If we wish to create array "D" with indexes zero through 11, place a dimension statement at the beginning of the program like this:

```
1 DIM D(11)
```

This tells BASIC to set aside room for indexes zero through 11 instead of zero through 10. If we wish not to waste space, we may even dimension for less than index 10 and only those spaces requested will be created.

Filling the array

Before we may set the number of days in a month from the array, we must place the numbers there. We could do it like this:

```
5 D(0)=31:D(1)=28:D(2)=31
6 D(3)=30:etc., etc., etc.
```

This is almost (but not quite) as bad as the bank of IF-THEN's used at the very beginning of the article. It doesn't take advantage of the most powerful property of an array—we can compute its index!

To make good use of the array's indexing ability, we'll use a FOR . . . NEXT loop to move the index one step at a time from zero through 11 and then READ the numbers in from DATA statements. Do it like this:

```
5 FOR I=0 TO 11:READ D(I):NEXT I
6 DATA 31,28,31,30,31,30,31,31,30,31,30,31
```

Now we have a program that can give us some

answers. Look at the program listing to see a simple running program example.

Some rules for arrays

Everything has rules and arrays are no different. First, we must dimension arrays when we deal with indices greater than 10. An index less than zero isn't allowed, but zero itself is.

If you compute an index and come up with a number like 10.36 for the index, BASIC will drop the decimal places and use only the 10. It's not rounding off, just dropping any decimal places. Even if the computed index were 10.999999, we would still get element 10!

Look in your BASIC reference manual for more material about arrays. ■

```
10 REM**********************************************************************
20 REM
30 REM            DEMONSTRATION OF ARRAYS
40 REM
50 REM            TERRY R. DETTMANN
60 REM            VERSION 1.0      10/20/81
70 REM
80 REM            FILENAME: ARRAY/BAS
85 REM            THIS IS A SIMPLE EXAMPLE OF HOW ARRAYS CAN BE USED
86 REM            FOR TABLE LOOKUP IN A 1 DIMENSIONAL TABLE
87 REM            LINE NUMBERS THAT ARE MULTIPLES OF 10 ARE NECESSARY
88 REM            TO THE PROGRAM, OTHERS MAY BE DELETED
90 REM**********************************************************************
100 RANDOM
105 REM           HERE WE'LL USE INDICES 1 THROUGH 12 TO REPRESENT MONTHS
106 REM           1 THROUGH 12. WHILE THIS WASTES ARRAY LOCATION 0, IT IS
107 REM           SIMPLER TO UNDERSTAND AND LESS LIKELY TO CAUSE PROGRAMMING
108 REM           ERRORS
110 DIM M$(12),D(12)
115 REM           WE'LL TAKE THE MONTH NAME AND NUMBER OF DAYS TOGETHER
116 REM           TO HELP PREVENT MISTAKES IN ENTRY INTO THE DATA
117 REM           STATEMENTS
118 REM           NOTICE HOW EASY IT IS TO FILL THE ARRAY, WE SIMPLY PUT
119 REM           IT INTO A LOOP AND READ THE DATA INTO IT
120 FORI=1TO12:READM$(I),D(I):NEXTI
130 DATA  JANUARY,31,FEBRUARY,28,MARCH,31,APRIL,30
140 DATA  MAY,31,JUNE,30,JULY,31,AUGUST,31,SEPTEMBER,30
150 DATA  OCTOBER,31,NOVEMBER,30,DECEMBER,31
160 REM - - - - - - - - - MAIN PROGRAM - - - - - - - - - - - - - - - - - - -
170 CLS:PRINT"THE MONTH GAME":PRINT
175 REM           GET A RANDOM MONTH FROM 1 TO 12
176 REM           THEN DISPLAY THE QUESTION
180 M = RND(12)
185 REM           NOTICE HOW SIMPLE IT IS TO DISPLAY THE MONTH NAME
186 REM           THE DESIRED MONTH NUMBER IS SIMPLY THE INDEX IN THE
187 REM           MONTH ARRAY . . .  NO MUSS, NO FUSS
190 PRINTTAB(5)"HOW MANY DAYS ARE THERE IN ";M$(M);
200 INPUT D
205 REM           HERE AGAIN, SEE HOW SIMPLE IT IS TO GET THE NUMBER OF
206 REM           DAYS IN THE MONTH.  AGAIN THE INDEX IS A NATURAL WAY
207 REM           TO GET THE DATA FROM THE ARRAY
210 IF D=D(M) THEN 260
215 REM           WRONG ANSWER
220 PRINT
230 PRINTTAB(5)"YOU GOOFED --- TRY AGAIN"
240 PRINT:PRINT
250 GOTO180
255 REM           RIGHT ANSWER
260 PRINT
270 PRINTTAB(5)"YOU'RE ABSOLUTELY CORRECT"
280 PRINT:PRINT
290 GOTO180
```

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SELECT APPROPRIATE RESPONSE:

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LEAVE WORD "AS IS":         HIT <ENTER> KEY
DISPLAY WORD IN CONTEXT:    ?
ADD WORD TO DICTIONARY:     +
EXIT:                       !

WORD:          (Your error)
RESPONSE:
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There are other proofreading programs available to choose from. Since MICROPROOF became available in December of 1980, a number of companies have announced programs with small dictionaries. It took us almost two years to develop MICROPROOF. During that time we were able to compress our full 50,000 word dictionary into a manageable size (fits on one single density 5¼ inch disk). And we were able to design a proofing program which operates remarkably fast. The chart below illustrates the comparative advantages of MICROPROOF.

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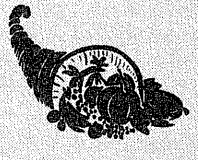

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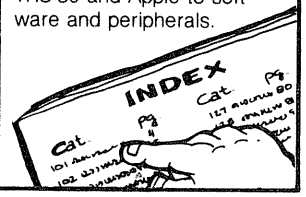

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Circle # 37

Hard disk operating systems

Checking out software on the CORVUS hard drive

For Models I, II and III

T. R. Dettmann, associate editor

I previously related some of my experiences with the CORVUS hard disk system I've been trying out. As a piece of hardware, it's as pretty as anything I've seen in a long time.

Despite its beauty, the real purpose of a hard disk drive is to make it possible to do something you couldn't do without it. In that case, beauty is really only skin deep. Software becomes the heart of the matter.

Without really good software, it's impossible to use the hard disk system with any kind of efficiency. Because of that, I looked at several operating systems that support the CORVUS drive. What I really wish to accomplish is to give some idea of how well each of these supports the CORVUS system. If you really want to get something done, which should you choose?

The operating systems

I looked at five operating systems which support the CORVUS system:

- CORDOS by Andy Frederickson
- HSDS by T. S. Johnston and D. L. Smith
- CP/M modification by CORVUS Systems
- NEWDOS-80 modifications by CORVUS Systems
- OASIS by Timothy Williams

Getting the systems ready for use

The simplest system to set up and run was the OASIS system. Once I had looked over the manual and played with the system without the CORVUS, I was ready to go.

All I had to do to set up the hard disk and start using it was to "ATTACH" the disk which loaded the proper disk driver to talk to the system and then "INITDISK" the system which formats it for use. Once these two commands were given (I set it up as one 20-megabyte disk instead of two 10-megabyte disks), I had 16384K of available space to play with!

The whole setup process only took a few minutes. The documentation was very clear about what to do. Five minutes after I started, I was saving programs and data files onto the CORVUS and really enjoying it.

To be honest, I really only put a dent in that space with disk files. Despite the fact that OASIS was a new operating system to me (I'd never seen it before in my life!), I found it extremely simple to use once I became familiar with its on-line HELP command.

Model II/III users are familiar with HELP. It tells them how to use various commands. OASIS HELP makes TRSDOS HELP look pale by comparison. After a quick brush through the manual, I found I could handle most of the commands by looking at HELP first.

The next easiest system to initialize was CORDOS. After backing up a DOS 2.0 disk on the Model II, I put in the CORDOS distribution disk, pressed a button, then reloaded the DOS disk. Soon I had a modified DOS disk with several new programs on it.

To run CORDOS, the new program, "CORDOS", is executed. This patches the TRSDOS operating system to accept the CORVUS drive. Executing "CORSET" (with various options) handles all the disks on the system.

Under CORDOS, there are always four disk drives available. Zero drive is always the Model II's installed drive. The other three may be assigned to either the normal disk drives or to "logical disk drives" on the hard disk.

By logical disk drive, I mean that parts of the hard disk may appear as if they were separate disks, each with its own directory and file structure. Using this technique, you may make drives of varying sizes for different purposes and make only those which you need available for use.

Using the INIT option on CORSET allows you to set up the disk for use. You decide which logical drives or "volumes" you want on the CORVUS. You may specify the size and name of each

volume as well as password and write protect status. (Write protect wasn't functional in the version I used for testing.)

CP/M turned out to be fairly simple to set up. It looked more difficult than it actually was in the instructions.

There are two ways to bring up CP/M. I chose the easy way. The first way (the hard one) involves actually changing the disk operating system BIOS (Basic Input Output System) using code provided on the CORVUS CP/M disk to make a permanent CP/M system that has CORVUS capability. In order to do this effectively, you must have the source code for the BIOS on your system. Not all CP/M vendors supply this. I understand that you may buy a system from Lifeboat which is already modified for the CORVUS drive.

The method I chose was to reconfigure my CP/M system to leave 1K of free space above it for CORVUS drivers. Once this was done, I had to edit the assembly language file for the CORVUS drivers to indicate where the free space actually was and then assemble the drivers for use.

Once assembled, I simply booted up my reconfigured CP/M system and executed the program I had just assembled. Immediately, it told me that the CORVUS was now on line!

The instructions had me use a special utility to initialize the disk space for use. This made the CORVUS appear as three 6-megabyte drives (C, D and E) to my system. From that point on, everything worked just as in normal CP/M. All the normal CP/M commands worked and didn't care that this was a hard disk.

The only real difference in operation was that I had more space on my drives. Since I had two expansion drives on the Model II, one of the two was essentially forgotten by the system as configured. However, it's only a matter of modifying the CORVUS driver to make another configuration useable. It requires a little skill with assembly language, but it isn't hard.

HSDS caused some real problems at first in getting set up. Preparing a disk for use as a system disk was as simple as with CORDOS. The distribution diskette handled everything. All I had to do was sit and watch. When that was done, I pulled out the paper that came with the system and tried to follow the instructions for formatting the CORVUS disk. No luck!

I spent the better part of a day fiddling with the system, regenerating it, trying the manual formatting instructions, and so forth. After rereading the manual several times and noting an inconsistency between manual and CORVUS instruction sheet, I found my problem.

I'm almost ashamed to admit it, but I wasted all that time over a typographical error that I should have picked up in the first five minutes. The sheet I had relied on had put parentheses instead of braces in the instructions. Consequently, my commands weren't accepted.

Once I corrected my error, it only took a few minutes to get on line with the CORVUS and start working. I set up the disk using their standard layout parameters and soon found that once again I had loads of disk space for use.

The last system I tried was for the Model I computer and consisted of a modification to NEWDOS80 to add CORVUS drivers to the system.

Once again, the manual proved my undoing. I fiddled with the original manual and changes, trying to follow them and getting myself messed up in the process. The manual didn't really reflect where the programs I had were, nor the exact condition of the disks I had.

After experimenting, I was able to set up the CORVUS for use. It took a few hours to get the hang of the procedure. In the process, I ruined several disks and had to go back to try again. Once the procedure was clear, I found it easy to initialize the disk system and start transferring files there.

Documentation

Much of the problem setting up the CORVUS with different systems came about because of my own difficulty reading the documentation. OASIS was completely new, but the manual was clear and I experienced no problems.

CORDOS and HSDS were reasonably automatic, but HSDS's manual was not a model of clarity. NEWDOS80's manual was comprehensive, but lacks step-by-step examples to carry a new user through operation.

For all practical purposes, the CP/M modification didn't have a real manual. There was documentation on the disk (a single sheet about how to put things together) and comments in the machine language programs (for which source code was provided). Since everything worked exactly as before after the patch was in, this wasn't much of a handicap.

Using the systems

Once each system was set up on the disk, I put them into use. I created files with programs, moved files, killed files, did directory listings and statistics on disk use. Each of the CORVUS systems had its own way of doing things.

The best integrated systems were CP/M and OASIS. Nothing changed in either system in terms of how the disk commands worked.

All of the CP/M utilities tested worked without any requirement to change the style or learning new commands. The OASIS commands were designed with the same thing in mind. Again, all commands that had worked on the floppy system were instantly available when the hard disk was in use.

The problem with CP/M and OASIS was that they were not TRSDOS compatible. Some people would cheer at that. But what they don't see is that there is a lot of material available for TRSDOS and more coming. The TRSDOS (Model II) compatible software (HSDS and CORDOS) was not as well integrated.

CORDOS had fewer new commands than HSDS, but was also less flexible—less able to handle the problems you need a hard disk for. CORDOS was simple to use, but was only able to change volumes on the disk. It did not provide any really new capabilities. Once a volume was on line, you used the normal TRSDOS utilities. This was nice since it didn't require learning a whole new language just to use the disk.

I put PROFILE and VISICALC files on the hard disk. I used several large and small programs, including some of my own accounting programs, without a hitch. CORDOS didn't slip in handling them.

I wasn't able to get SCRIPSIT

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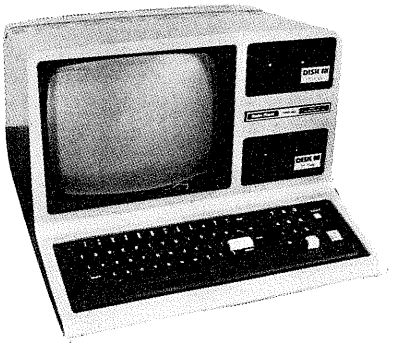

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working on the disk because of the way it functions. CORDOS warns you not to FORMAT or BACKUP to the disk volumes since that will scramble the disk. If you use SCRIPSIT and want to start a new disk, you must FORMAT a special SCRIPSIT file. I thought about preparing one on a floppy, copying it to the CORVUS and then working with it, but I still had to have the CORDOS modification in drive zero. I finally ran out of time for this experiment, but I'm sure it could be done.

On HSDS, I didn't have time for the Scripsit experiment, but I did use all the other programs with the system, storing and reclaiming data without trouble. HSDS comes with a number of special utilities for hard disk systems (CORVUS or others) which are in themselves worth the price of the HSDS system.

The utility I most want to mention is the HDCS directory catalog system. It is a versatile, fast catalog system for disks, either floppy or hard. You can read directories, sort them in various ways, save the list, print it and more. This one I really liked.

The NEWDOS 80 system made all of the storage available to me on my old Model I computer. Despite the problems I had in initialization, this became the most powerful of the CORVUS operating systems. In addition to the normal NEWDOS features, which worked satisfactorily, new features were added which allowed almost unlimited use of the CORVUS.

You can set up virtual files which are opened and closed with special USR calls. These may be as small as one sector (256 bytes) or as large as 65536 sectors (16.8 megabytes).

The entire system is protected by having a system manager account that can change the disk and set aside volumes for other users. Everyone else's use is controlled by the system manager.

The manager can allocate public volumes (for compilers, etc.), private volumes (one user alone) and even limit a particular volume depending on the skill of the user.

Summary

After all I've done with the CORVUS system and the five operating systems, I find there is still so much material left that I could easily fill the next year of *80-U.S.*. I found that the CORVUS system with its different operating systems is a remarkably versatile system that can extend the capability of even your old Model I to nearly mini-computer level. You can avoid buying a lot of very expensive computer equipment in order to get big system capability by adding one or more hard disk drives.

One local company runs nothing but Model I computers, all attached to a CORVUS 20 megabyte hard disk system and using NEWDOS 80. They have been running that way for quite some time now and are expanding by adding more Model I's! When asked why they didn't get a Model II, they replied, "What for?"

You can do this same kind of networking in your business, even have people calling in over the phone and accessing your system. If you've been wondering where to go because you're getting too big for your Model I, then look here. I think you'll like what you see. ■

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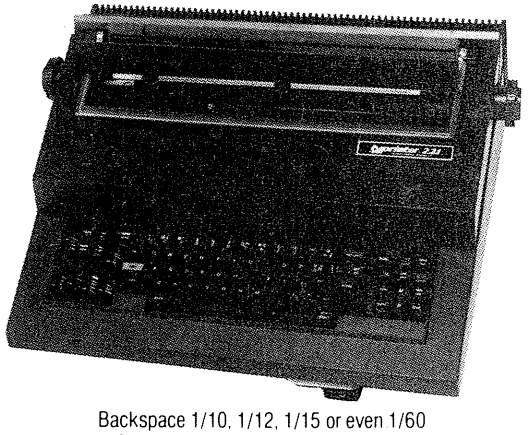

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Circle # 40

Hand me that memory

. . . and don't spill the mercury!

All of us have read some dry articles about early computers. Usually there's a picture of a white-smocked lab technician (preferably of the female gender) holding a tiny integrated circuit. In the background, there's an early behemoth called KIDNEYVAC, or some other acronym. Ho hum. We all know about how computer size has been reduced, along with speed and sophistication...

Recently, however, I ordered two books that turned the dry facts into several fascinating evenings of reading. The first, *"Early British Computers"*, by Digital Press (Digital Equipment Company), covers early British developments. The other, *"From Dits to Bits"*, by Robotics Press, is an autobiography of an early computer engineer. Since they both cover the same era, from pre-war (Doubleyou-Doubleyou-Two, that is) to the mid fifties, they turned out to complement each other in interesting ways.

"Early British Computers" is a 140-page book by Simon Lavington which covers developments by our friends across the sea. Surprisingly, British developments were quite comparable, or even ahead of American developments in the field. I say "surprisingly" not to belittle the British, but because we normally are told only about early U.S. computers. In fact, the British were quite active.

Babbage, of course, was British. His 1830's mechanical computer utilized a stored program. It never worked at the time, because of machining tolerance limitations in the 1800s.

During the Second World War, the Germans used code machines called Enigmas. These operated on a "code wheel" concept of three, four, or ten rotors. Since the number of combinations for three rotors was 10 to the 21st power, the resulting codes could not be cracked by hand—automatic devices had to be used. The British originally tried cracking the codes with relay-based computational devices, but these proved far too slow, although some decoding was possible. Code-cracking machine effort produced an all-electronic machine called COLOSSUS in 1943, containing 1500 vacuum tubes, a precursor of more versatile computers of the '40s.

After the war, computer development continued, based upon much of the war research. Relay-type machines were discarded in favor of processors with vacuum tubes. Visualize a processor containing 2000 vacuum tubes, each the size of a small flashlight. A typical register, similar to a microprocessor accumulator, might typically occupy a section of a "door" measured in square feet. The entire computer assembly occupied bay after bay of electronic rack enclosures. Since these were experimental devices, wiring was often "haywire" and strung around near the ceiling.

Memory was interesting. Semiconductor devices, other than rudimentary diodes, did not exist. Core memory was also a few years in the future. Early memory consisted of such devices as magnetic drums, mercury delay lines, cathode ray tubes, and magnetostrictive delay lines.

Magnetic drums were similar to today's disk storage, but based upon a drum configuration. They were not used for storage of files (memory was measured in hundreds of words), but the actual instructions themselves. Program execution speed could be optimized by the proper physical placement of instructions on the drum, (so-called "minimum latency" programming).

The mercury delay line was a four to five foot long rod filled with mercury. Pulses were converted to sound waves for propagation through the mercury to get the speeds down to manageable rates. A string of pulses made up the contents of the memory.

Cathode ray tube storage utilized storage of bits as phosphorescent areas on the face of the tube. Readout was not visual, although visual means could check the results. The British Williams tube set the standard for this type of device.

Magnetostrictive delay lines used the fact that electrical currents stress thin (typically nickel) wires. The signals here were also acoustical.

One of the earliest computer projects was designed by Dr. Alan Turing. Turing (of "Turing Machine" fame) was a brilliant mathematician who had been involved with COLOSSUS. His design for the Automatic Computing Engine (ACE) was largely self-conceived. Turing was a

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Circle # 41

somewhat controversial figure (he occasionally arrived at meetings with track apparel and a large alarm clock for recording his running pace).

The ACE ran a simple program in the spring of 1950. The ACE consisted of 800 vacuum tubes and used a clock frequency of one megahertz. Main storage was 128 words of 32 bits each in mercury delay lines. Instruction times were dependent upon the position of data in the delay lines. Additions took from 64 microseconds to one millisecond. Input and output was accomplished by punched card.

Microsoft BASIC was decidely not around in those days. Programming was strictly in machine language, utilizing binary punched-card input. Each 32-bit instruction specified the address of the next instruction(!), the operand locations and timing parameters.

The first generation British computers were the EDSAC and Manchester Mark I. The EDSAC (in a time of acronyms, EDSAC stood for Electronic Delay Storage Automatic Calculator) was designed and built at Cambridge University. It ran its first program in spring of 1949. EDSAC was one of the first computers to use an elementary type of symbolic assembly language—the programmer wrote out his instructions in alphabetic characters such as A24 S (add into accumulator the contents of line 24). The Manchester University Mark I machine ran a factoring program in the summer of 1948, one of the first computers to successfully run a stored (as opposed to hard-wired) program. Both the EDSAC and Mark I used vacuum tube technology.

"Early British Computers" goes on to describe further computer developments that used the new diode technology and other advancements in computer hardware, including a computer financed by the J. Lyons Catering Company(!) called LEO.

It's interesting to note that many concepts that we take for granted, such as a stored program, intermixing of instructions and data, stack operation and others, were not at all obvious. They came about by the original thinking of some of the giants of computer technology. It is also fascinating to see that some sophisticated concepts were present in these early computers such things as hardware floating point, high speed paper tape and rudimentary assembler language.

A chapter at the end of the book talks about United States computer development in the same period. One detects some nationalistic feelings about British developments that probably underscore the lack of recognition we have for British computer research.

"From Dits to Bits" is a 226-page autobiography of an early computer engineer that dates from the time when there were no computer engineers. Herman Lukoff played an active part in computer engineering for the ENIAC (Electronic Numerical Integrator and Computer), EDVAC (Electronic Discrete Variable Automatic Computer), UNIVAC (Universal Automatic Computer), LARK (Livermore Automatic Research Computer) and UNIVAC II.

The book is very much an autobiography. We are told about Lukoff's interest in amateur radio at an early age (hence, the "dits" from Morse code), his decision to go into electrical engineering, and his induction into the Navy in the War (Doubleyou-Doubleyou-Two, again). At first, one is tempted to put down the book because of this mundane prologue, but you would be advised to stick with it. Everything ties in to the story, and it turns out to be rather poignant.

The meat of the book concerns Lukoff's experiences in computer design. Although Lukoff never had responsibility for overall design of any of the computers, he soon became one of the foremost computer engineers in a time when there were only dozens.

Lukoff was an engineering student at the Moore School of Engineering of the University of Pennsylvania during the early years of the war. As a bright graduate student, he got involved with a small segment of the ENIAC design. ENIAC was developed for the Aberdeen Proving Grounds as a general purpose computer by Eckert and Mauchley of the Moore School. Here again, requirements for high speed computing for the war effort led to funding.

ENIAC was not a stored program. Computer cables had to be unplugged and the machine reprogrammed by new connections. The ENIAC design led to the EDVAC design in which instructions would be stored in memory and "rewiring" would be done at electronic speeds. Memory consisted of mercury delay lines.

Mauchley and Eckert made the decision to leave the Moore school in the fall of 1947 during the middle of EDVAC development. The result was the Electronic Control Company, which was to become part of Sperry-Rand. Lukoff went with them.

Lukoff played significant roles in the development of Sperry-Rand computers. His descriptions of the computers are fascinating because he describes the designs down to a nuts and bolts level—what pattern was best for CRT storage?—what was the best design for the delay line memory?— what was the cause of mishappen pulses in the circuitry? The whole book is a chronological account of the development of early computers from an engineer's level. Then, as now, they were pushing technology to the limit to get faster speeds, reliable operation and competitive products.

Lukoff also provides plenty of insight into the politics of the company. One of the questions answered in the book is this: Given such an enormous lead in computer development, why did Sperry-Rand drop the ball - why didn't they become IBM?

Another aspect of the book is the descriptions of working conditions for the engineers. There's nothing new under the sun. Company policies came down forcing the engineers to work Saturdays (for no pay or compensatory time off of course), Lukoff was told he had to move to St. Paul. (If this sounds like a typical pattern for a struggling new technology company, it is.) Lukoff, however, obviously ate it up —he loved engineering in general and the design and development of computers in particular.

Both *"Early British Computers"* and *"From Dits to Bits"* are must reading for anyone involved in personal computers. Computing has changed, and yet it has not changed. Then as now, programming was tedious. Then, as now, computer development was pushing the state of the art. Then, as now, companies were continually looking for new, innovative ways of implementing hardware and software. Reading either or both of these books will do a lot in dispelling some of the mystery of computer technology as things are put into historical perspective. ■

Files & foibles

Hash codes simplified

For all models

T. R. Dettmann, associate editor

A hash code is a general form of table lookup procedure known as *key transformation*. The key variable contains the information used to recover the data record.

Why hash coding? There are several good reasons:

1. It can cut searching time to as little as a single look if we're lucky.
2. It can provide a simple access technique for complicated record keys.
3. It can reduce the size of a file required to store information.

In the September issue, a "To Do List" program was used as an example of a keyed file. The key used was the date due for a project. By putting this key into an array, the file could be searched quickly without having to look at each record.

To make the index reliable and efficient, it must be kept on disk. To do this without having to sort the index, it is necessary to change the key to another form. This process is called "key transformation". Come up with a routine which transforms a key to a number and use that number for the record that stores the data.;

If a key, such as "02/10/81", is entered and the output is the number five, then the data for the date "02/10/81" goes into record number five. This creates an immediate problem: What can be done with more than one record which has the same key? In that case, the basic hash technique breaks down and something else has to be done.

Another problem occurs when the routine generates the same record number for more than one key. This situation is quite possible and something which computer scientists have worked on for years. The problem may be more or less frequent, depending on how the routine works.

When two records have the same hash code, they *collide*.. What you do in this case depends on the file. If less than half of the index is used and the items are pretty well spread out, a simple solution is to start with the hashed record number and keep adding one until an empty record is located. This procedure could result in a serious problem.

Suppose the routine *always* produces a one, in which case, the first entry will go into position one, the second in position two and so on. When a particular record is wanted, you must start with record one and search sequentially through the file until it is found. This is known as a *linear search*. The "To Do List" program uses this method; each *disk entry* is examined instead of the *index array*, resulting in a real slowdown. However, if the same hash code for different keys is *never* generated, then a collision never takes place and the first record will be the one wanted.

With a reasonable amount of care in the design of a hash code, performance will be somewhere between the two extremes. To keep collisions to a minimum, the index table has to be kept larger than the number of items in it: too little space and there will be a large number of collisions; too much, and disk space is wasted. Therefore, the table should be approximately twice as large as you think will be needed.

To detect a collision, it is necessary that the full key be kept somewhere. It could be kept as part of the allocation table which may save some time in finding the record later. Another method is to keep the key in the disk record where it could be checked for correctness. You should choose the method which seems most effective for a particular application.

The hash code generator

The success of a hash coding system depends on the hash code generator. If the keys are "hashed" in such a way that they distribute themselves evenly through the table with a low probability of collision, you'll have a very efficient system. Ideally, the hash code should be unique for a given key.

Consider an inventory system, for example. While part numbers may run from one to 100,000

there are only 250 different part types on hand at any one time. This is a perfect job for a hash coded system.

First, set up a table with 500 records. Next, look for a way to generate a unique number between one and 500. One method is to take the part number, divide it by 500, obtain the remainder and add one. The result will be a number between one and 500 and is called the *modulus*. The hash code generator formula is:

HC=IV-INT(IV/500)*500+1

where HC is the hash code and IV is the inventory number. Using the hash code formula, the following table of sample hash codes can be derived.

Hash Codes

Inventory #	Hash Code
1	2
237	238
1567	68
10737	238

Some collisions will occur with this method. To handle them, take the simplest approach and search until an open spot is found. If the end of our table (record 500) is reached without finding an open spot, start over from record one. If the table has been completely searched without finding an open spot, the file is full. This could be more complex, but for now, simple is best.

If the key isn't a series of numbers, but instead is a collection of names, a similar technique may be used to generate a hash code. One simple method is to assign each character a number and then add them together: let A equal one, B equal two and so on. For my name we have:

D E T T M A N N

4+5+19+19+13+1+14+14=89

If the first 10 characters of the last name are used, then the smallest hash code is one (if someone's last name is "A") and the largest is 260 (if someone's name is "ZZZZZZZZZZ"). For less than 100 names in the table, it should be sized for 260 records and the generated hash code is used as the record number. As an alternative, the table could be limited to 200 by use of the *modulus* method described earlier.

If there are 500 names to enter, there is a problem: the hash code only goes up to 260. The range is expanded by multiplication and the extra space is used for collisions.

Other alternative methods may produce the range of numbers wanted with fewer collisions. There is no such thing as an "illegal" hash code generator. If it comes up with numbers we want, in the range we want, use it!

In the last two articles of this series, we've put together some techniques for keeping a random access file on disk. You may now have an allocation table on disk and with hash coding we don't need an index table. The following sample program is a simplified example of what can be done with hash coding. ■

Listing for all models

```
10 REM*********************************
20 REM
30 REM  DEMONSTRATION OF A HASH CODING
35 REM               SYSTEM
40 REM       BY TERRY R. DETTMANN
50 REM
60 REM      VERSION 1.0   10/20/81
70 REM        FILENAME: HASH/BAS
80 REM
90 REM*********************************
100 CLEAR 10000 : DEFINT A - Z
110 OPEN "R", 1, "HASH/DAT" : FIELD 1,
255 AS NM$
120 NUM = 20
130 LSET NM$ = "ZZZZZ" : FOR I = 1 TO N
UM : PUT 1, I : NEXT I
140 DIM H1(10), H2(10), A$(10)
150 REM - - - - - MAIN PROGRAM - - - -
160 CLS : PRINT "HASH CODE DEMONSTRATIO
N"
170 PRINT "TYPE IN 10 NAMES"
180 FOR I = 1 TO 10
190 PRINT TAB(5)I; ": ";
200 LINE INPUT A$
210 A$(I) = A$
220 GOSUB 400
230 H1(I) = HC
240 GOSUB 500
250 NEXT I
260 CLS : PRINT "HASH CODE DEMONSTRATIO
N"
270 PRINT TAB(5)"NAME"; TAB(22)"HASH CO
DE"; TAB(35)"LOCATION"
280 FOR I = 1 TO 10 : PRINT TAB(5)A$(I)
; TAB(25)H1(I); TAB(35)H2(I) : NEXT I
290 PRINT : PRINT : PRINT
300 PRINT "TYPE IN A NAME: ";
310 LINE INPUT A$
320 GOSUB 400
330 GET 1, HC
340 IF LEFT$(NM$, 5) = "ZZZZZ" THEN PRI
NT "NOT FOUND" : GOTO 370
350 GOSUB 720
360 IF FLG = 1 THEN PRINT "FOUND "; NM$
 ELSE GOSUB 610
370 PRINT "PRESS ENTER TO LOOK FOR ANOT
HER NAME"
380 C$ = INKEY$ : IF C$ = "" THEN 380 E
```

File handling technique

```
LSE IF ASC(C$) <> 13 THEN 380
390 GOTO 260
400 REM - - - HASH CODE GENERATOR - - -
410 IF LEN(A$) >= 10 THEN MX = 10 ELSE
MX = LEN(A$)
420 HC = 0
430 FOR I1 = 1 TO MX
440 C$ = MID$(A$, I1, 1)
450 HC = HC + ASC(C$) - ASC("A") + 1
460 NEXT I1
470 HC = HC - INT(HC/NUM) * NUM + 1
480 PRINT "HASH CODE: "; HC
490 RETURN
500 REM - - - ENTER ITEM IN TABLE - - -
510 H2(I) = HC
520 GET 1, HC : IF LEFT$(NM$, 5) = "ZZZ
ZZ" THEN LSET NM$ = A$ : PUT 1, HC : RE
TURN
530 PRINT "COLLISION - SEARCHING"
540 NR = HC
550 NR = NR + 1 : IF NR > NUM THEN NR =
 1
560 IF NR = HC THEN PRINT "TABLE FULL"
: RETURN
570 PRINT "DISK ACCESS"
580 H2(I) = NR
590 GET 1, NR : IF LEFT$(NM$, 5) = "ZZZ
ZZ" THEN LSET NM$ = A$ : PUT 1, NR : RE
TURN
600 GOTO 550
610 REM - - - - SEARCH FOR NAME - - - -
620 NR = HC
630 PRINT "COLLISION"
640 NR = NR + 1 : IF NR > NUM THEN NR =
 1
650 IF NR = HC THEN PRINT "NOT FOUND" :
 RETURN
660 GET 1, NR
670 PRINT "DISK ACCESS"
680 IF LEFT$(NM$, 5) = "ZZZZZ" THEN PRI
NT "NOT FOUND" : RETURN
690 GOSUB 720
700 IF FLG = 1 THEN PRINT "FOUND: "; NM
$ : RETURN
710 GOTO 640
720 REM - - - COMPARE FOR EQUALITY - -
730 FLG = 1
740 FOR I1 = 1 TO LEN(A$)
750 C1$ = MID$(A$, I1, 1) : C2$ = MID$(
NM$, I1, 1)
760 IF C1$ <> C2$ THEN FLG = 0 : RETURN

770 NEXT I1
780 RETURN
60000 SAVE "HASH/BAS"
```

■

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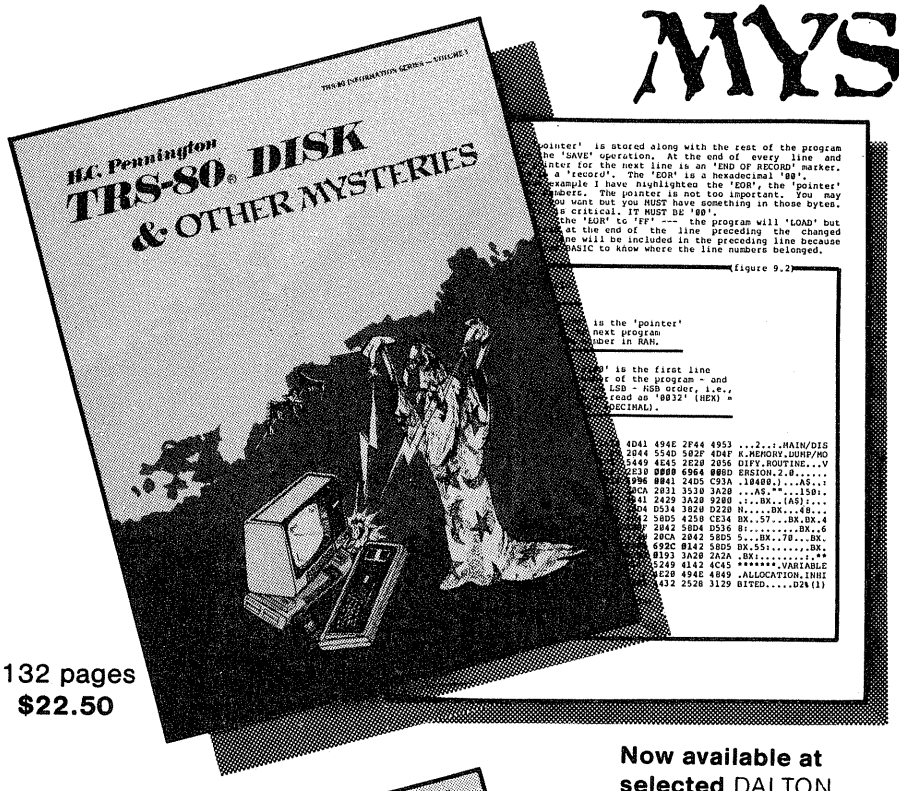

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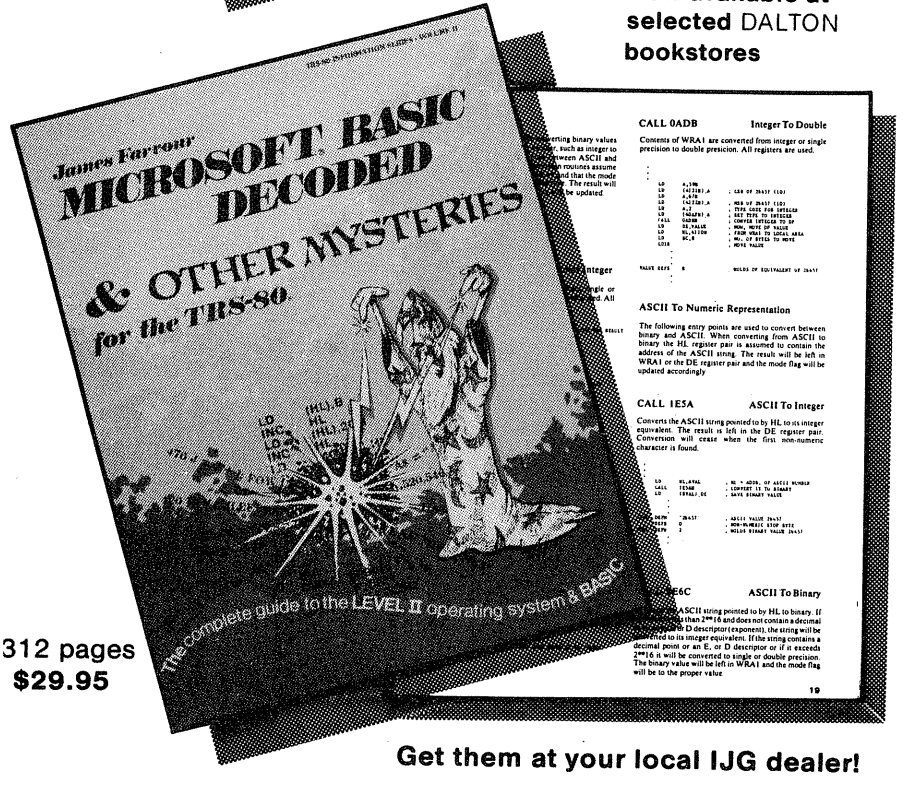

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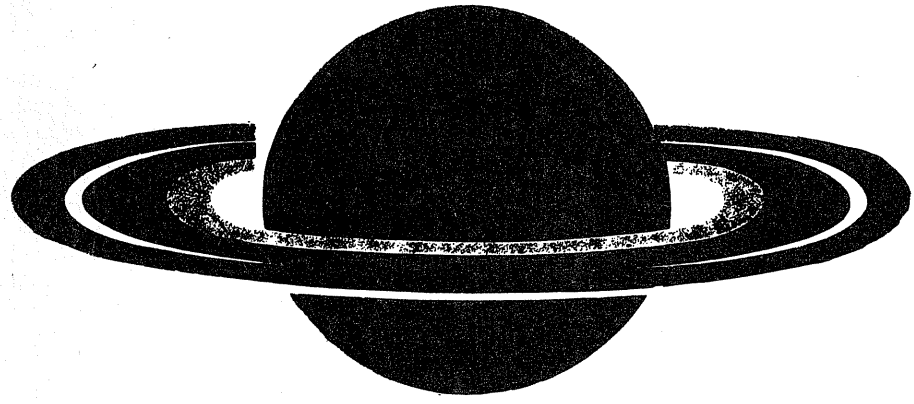
Captain 80



Here's Captain 80 — on the road to adventure, poised above the keyboard in preparation for a journey into the far reaches of deep space.

Forbidden Planet is the first major offering from Las Vegas-based Fantastic Software. It is not a maiden adventure for William Demas, the author, whose credits include Timequest from The Programmer's Guild and Golden Voyage from Adventure International.

Forbidden Planet is a conventional adventure in the split screen, high-speed machine language sense of the word. It starts slowly, with simple puzzles to solve within the confines of a spacecraft hurtling toward certain destruction. If the right combinations are initialized, the ship is saved and planetfall is achieved.

If there were only the adventure alone, there would be ample reason to buy and enjoy Forbidden Planet. The plotline is strong, the puzzles tempered with an understanding of an adventurer's need to be challenged, but not overwhelmed, with unsolvable second guesses to the author's mind. The descriptions are crisp and colorful without verbosity. Beyond the factors which make this offering a winner among peers in its genre is the unique addition of speech.

"Speech?," you say. 'Tis true. The power of speech is bestowed, using the cassette port as the vehicle. It is done as a complement to the overall program. "What?," the voice demands when the player inputs something that does not compute. You may catch a hint of impatience if you listen carefully. "Okay," it agrees, given the correct response. "I see something," comes as a declaration of discovery—the enthusiasm is detectable.

The voice is human, not mechanical, digitized by a special process that Al Loose of Fantastic Software is keeping close to his vest, much to the chagrin of adventure publishers and other technologists anxious to add the glitter of speech to all manner of micro-programs.

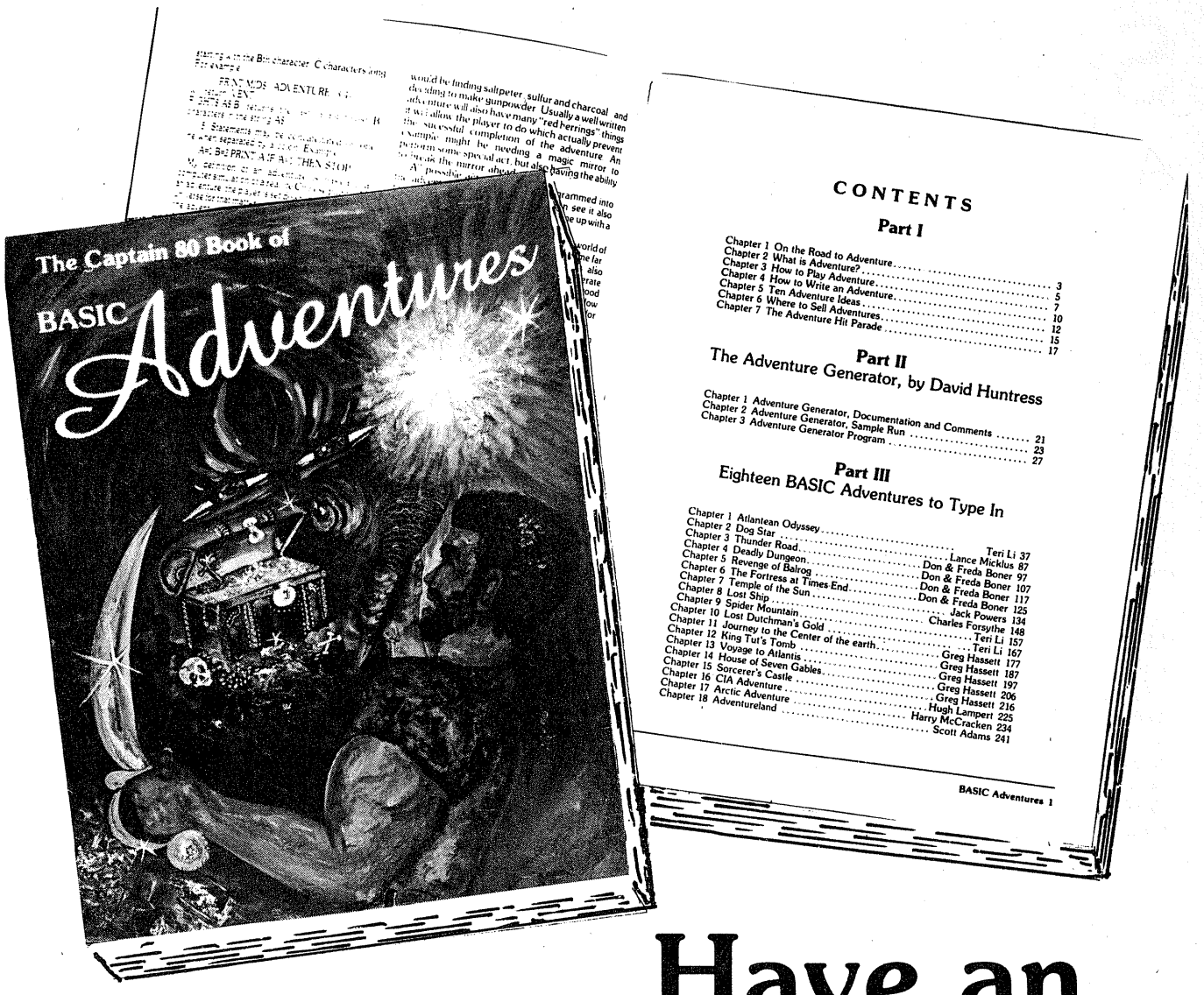
Forbidden Planet is not for everyone. It requires a minimum of 48K and a disk system. This, partially due to the fact that speech requires 600 bytes per word in this configuration. Heft, considering that the scenario modules pull considerable memory also. However, if the hardware requirements are met, the adventurer is in for a treat. I'm not looking forward to solving Forbidden Planet. I'm having too much fun playing it.

Does the advent of speech and graphics mean that the conventional adventure is dead? I think not. It is true that Forbidden Planet has been an early runaway best seller and Interpro's Illustrated Atlantean Odyssey, which features on-screen pictorial descriptions, has been a comparative success. At the same time, Savage Island, parts one and two, which sports no gimmickry other than the fine creative hand of adventure godfather Scott Adams, has also been building impressive sales. MED Systems graphic adventures, Assylum and Death Maze 5000, which are excruciatingly tough to solve, enjoy a unique and unchallenged place in the market, since no one else has offered any form of three-dimensional mazing. Even BASIC adventures have a following. Instant Software's distribution of Temple of the Sun has spiraled upward since its release.

What is the appeal of adventure? The simple answer is imagination. It is easy to picture the plight of the poor puppet in the Adams classic Pirate's Cove. The ghost of Backpack Sam in Teri Li's Dutchman's Gold is a colorful moderator to the search for Old West treasure. While there is no specific entity to relate to in Forbidden Planet, the *voice* makes the player feel like the author is looking over his shoulder. How can you help but admire the craftsmanship of the authors of Atlantean Odyssey or Assylum as their particular words visually come alive beneath your fingers?

One needs only to look at the titles of these adventures to visualize the imagination of the authors: Strange Odyssey, Mystery Funhouse, Zork, Deadly Dungeon, Mystery Mansion, Gauntlet of Death, Dragonquest—the list goes on and on. Each title reflects a deep recess in the imaginary world of the author and each adventure is a pocket universe waiting to be explored and conquered.

Welcome to adventuring, Fantastic Software. Your attractive packaging and hard-charging approach to the marketplace should wake up and serve notice to all software manufacturers who've been taking the consumer for granted. There are still lean, hungry new producers out there willing to go an extra mile for the customer. As for Bill Demas, whose talent shines in Forbidden Planet, we extend an old, but still powerful, fantasy world curse: "May all your dungeons be deep, well stocked and interesting," or at least as interesting as Forbidden Planet. ■



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System/command

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James F. Williams, Rocky Mount, NC

Did you know that there *is* a use for that crummy condenser microphone on the top of your cassette player? It is possible to control your TRS-80 from across the room by using that tiny microphone and a machine language program which I call *Sound Counter*.

This routine could be used to add realism to some games by having the computer respond to a shout, whistle or hand clap. (Imagine a submarine game in which you would yell "fire" to send a torpedo toward its target.) Do you need some means to keep up with the count of exercises you're doing on the den floor? (Just give a hearty grunt after each one and the computer could respond to it.) I have included a BASIC program that scores games which need cumulative totals (Scrabble, Hearts, etc.).

I have designed the routine to be called from BASIC via the USR command. This routine works very much like the BASIC's INKEY$. However, instead of strobing the keyboard, it queries the cassette's microphone to see if any sounds are present. If not, the routine immediately returns a zero in the USR variable much like the way INKEY$ returns a null character if no key is pressed. If there is a sound, the machine routine takes control for a couple of seconds. It waits to see if an additional sound will be issued (the microphone is "debounced" so that the same sustained tone will not count as a multiple entry). If no sound is issued after the maximum delay time, the number of distinct sounds is returned to the USR variable and BASIC regains control.

The routine is quite flexible, is capable of registering counts at varied intervals and can easily register as fast as you can clap. It can count from zero to 65535, although your arms may get a bit tired before the maximum count is reached.

To write your own routine using

Sound Counter, copy the first three lines of the BASIC program. You may change the amount of string space CLEARed and the variables which are defined as integers. The variable Z must be an integer for disk users (see disk modifications at the end of the program). Remember not to reuse A$ in your program. The first three lines pack the machine language routine into a string and make the USR definition.

If you want the program to wait for sound input, put the USR statement in a loop like this:

```
100 X=USR(X): IF X=0 THEN 100
```

When the loop falls through, X will contain the number of distinct sounds.

The cassette player will take a little preparation for sounds to be registered through the microphone. If you have the early model cassette players (CTR-41), simply unplug the dummy plug in the microphone jack. For newer models, unplug the auxiliary cable. For both models, take the cassette tape out of the player, hold down the write protect sensor lever (the lever on the left inside of the cassette cartridge area), and press the record and play buttons. If the motor control plug is still in, nothing will happen. The program will turn the cassette player on when it needs to hear something. It is wise to unplug the smaller grey plug to keep the capstan roller from getting a dimple.

Let's look at how to use the BASIC program that I gave you. Imagine that you invited friends over for a game of Scrabble. There are four of you and you are going to play in the room with your computer. Obviously, moving the computer to the card table would be trouble enough, but there would also be little room left for the four of you. Therefore, instead of nasty pencil and paper, you will impress your friends with the remote control sound scoring program. After deciding the order of play, you casually walk over to the computer and type RUN. (Always have your program loaded before your guests arrive. No one is favorably impressed by program loading problems.) The program asks for the number of players. You answer four (the program will handle 10 without modification). Next, enter the names of the players in the order they will play. (Be sure to use cutesy nicknames—that always gives a more personal touch.) The program will display the screen which gives the codes used to clap in the scores, one digit at a time. (0 is 10 claps and a negative sign is 11 claps. The negative sign may occur before, after or between digits.) You should quickly pass over this screen. Make them think you know what you are doing. Prepare your cassette player to receive sounds (see above).

Take your seat now and play the game. After the first person scores, clap your hands three times to get the computer's attention. It should respond with the player's name (in double width characters, so you can read it from across the room). Clap in the first digit of his score. After a slight delay, the computer will respond with the correct digit. Clap in the second digit if his score is more than one digit long. After his score is in, wait for a bit and the computer will respond, "CLAP 3 TIMES TO CONFIRM." If the score is correct, clap three times and the cumulative scores of all the players will be shown. If the score is not correct, don't clap at all. A "NOT CONFIRMED" message will be shown and the program will loop back and wait for the score to be reentered (after three claps). Play may be continued indefinitely and each player's score will be updated and displayed.

If your Scrabble games are like ours, the extraneous noise level can get pretty high at times—high enough to make the computer think that you may be talking to it. This is the reason three claps are used to get into the scoring routine and three claps to confirm the score. Of course, a carefully disguised, "Ha ha ha, ha ha, ha ha, ha ha ha" could be used to better your score by 22. (Use only if necessary.)

For those who are interested, let me give some more details about the BASIC program.

The first POKE in line 10 is the famous READ error fix. Without it, some Model I computers will READ in the first DATA statement value repeatedly if the computer has not performed an INPUT statement since power up.

The machine language program is stored in string space. Because of the way I built the string, you must CLEAR at least twice as many bytes as the machine language routine contains. The "X=FRE(A$)" statement is a very important one that is often left out of discussions of string packing. If you wish to set the USR branch address only once, it is imperative that your machine language string not move around after the definition has been made. It must be packed into the very top of string space. Building the string fills the string space with garbage (each reassignment of A$ in the READ loop becomes garbage). The "X=FRE(A$)" statement forces garbage collecting and puts A$ at the very top of the string space. If this statement was left out and string packing was forced after the USR assignment in line 15, the machine language string would move and the USR definition would no longer be valid.

To understand the POKE statements in line 15, you must understand the VARPTR format of strings. The first byte is the length and the last two bytes define the address in the string space area. The POKE statements simply assign that address to the USR branch. Because the disk USR branches are located elsewhere in memory (in the disk version), I first assign the address to a variable, then use disk BASIC's DEFUSR command with that variable (see lines 180 to 220).

Line 30 prints the title and requests the number of players.

Line 40 reads in each player's name and assigns it to the array N$().

Line 50 prints directions for data entry.

Line 60 sets up the master FOR... NEXT loop for the number of players.

Line 70 clears the screen, sets double width mode and prints each player's name and score (the scores are in array S(), an array parallel to the name array).

Line 80 prints the "CLAP 3 TIMES" prompt with the player's name.

The first part of line 90 loops until three claps are registered. It sets this score (T!) to zero and sets the sign flag (S) positive.

Line 100 sets the timer variable (U) to zero.

Line 110 loops until a sound is registered or the timer variable U reaches 150. If U reaches 150, it is assumed that the score is zero and a branch is made to the "confirm

routine" in 140.

Line 120 checks for validity of the digit (less than 12). If it is not valid, it branches back to the score display routine (line 70). If the digit is valid, it checks to see if it is the sign (code 11). If so, the sign flag is set negative and the minus sign is displayed; otherwise it checks for the zero (code 10), and sets the variable to zero if true.

Line 130 accumulates the digits and stores them in real value in T! It prints the digit itself (ignoring leading and trailing spaces). Finally, it loops back for another digit (line 100).

Lines 140-160 are the confirm routine. If three claps are not registered in a certain amount of time, the datum is considered invalid and the program loops back to try again.

If the datum is confirmed, the player's score is updated and the next player is set. (If the master FOR . . . NEXT loop runs out, it is reset to player 1.)

If you've hung in there this long, then you must be ready for the discussion of the machine language routine.

The code is completely relocatable. This is necessary for any routine that is to be packed. The routine does not take any parameters from BASIC (hence no CALL 0A7FH at the beginning of the program). HL is used for the count and it is set to zero in line 170.

The check for sound is quite simple: after an IN A, (255), check bit seven of A. If there is sound, it will be on; otherwise it will be off. At the same time, bit six indicates if you are in double width mode. If you wish to stay in double width mode, be sure to OUT a byte with bit three on. Also, if you want the cassette motor to stay on, you must OUT a byte with bit two on. Therefore, I used the D register to hold both conditions (12 for both bits on, or four for only one bit on).

To check for sound, I use the one byte instruction RLA. If bit seven is on, the carry flag will be set. Line 240 determined that there was no sound, so the exit to BASIC is immediate.

If there is sound, we do not want it to register more than once. Therefore, the debounce routine is entered at 290. On the Model I and on the Model III at low speed, it is necessary to reset the IN latch with an OUT instruction before another valid IN instruction can be read. Therefore, we delay a bit in 290 and 300, then OUT the saved value in D. After another delay, we can check to see if the sound continues. If so, we loop back into the debounce routine until all is quiet.

When the debounce routine is exited, increment the counter (line 380) and jump back to test for another sound. If no sound is present, delay a while to see if it is forthcoming. When NOSND (line 400) is first entered, BC equals zero (from the previous CALL 60H). If it loops 65536 times, the maximum two byte delay has occurred and the routine goes back to BASIC with the number of distinct sounds in HL. The routine at 0A9AH passes this value to the BASIC variable.

If the delay is too long for your uses, simply load BC with an appropriate value in line 385.

Machine Language Listing

```
                00100 ;SOUND COUNTER
                00110 ;(C) 1981 BY JAMES F. WILLIAMS
                00120 ;BYTE MISER SOFTWARE
                00130 ;720 WEST HAVEN BOULEVARD
                00140 ;ROCKY MOUNT, NC 27801
                00150 ;
9000            00160          ORG     9000H       ;CODE IS RELOCATABLE
9000 210000     00170 ENTRY    LD      HL,0        ;SET COUNT TO ZERO
9003 DBFF       00180          IN      A,(255)     ;CHECK FOR SOUND
9005 CB77       00190          BIT     6,A         ;DOUBLE WIDTH?
9007 160C       00200          LD      D,12        ;ASSUME YES, SET BITS 2,3
9009 2802       00210          JR      Z,DOUBLE    ;YES
900B 1604       00220          LD      D,4         ;NO, BIT 2 ONLY
900D 17         00230 DOUBLE   RLA                 ;SOUND?
900E 3023       00240          JR      NC,RETURN   ;NO SOUND: RETURN TO BASIC
9010 1805       00250          JR      DEBNCE      ;YES, TO DEBOUNCE ROUTINE
9012 DBFF       00260 LOOP     IN      A,(255)     ;SOUND?
9014 17         00270          RLA
9015 3017       00280          JR      NC,NOSND            ;NO
9017 010005     00290 DEBNCE   LD      BC,500H     ;YES, DELAY SLIGHTLY
901A CD6000     00300          CALL    60H
901D 7A         00310          LD      A,D
901E D3FF       00320          OUT     (255),A     ;RESET FOR NEXT SOUND
9020 010005     00330          LD      BC,500H     ;DELAY AGAIN
9023 CD6000     00340          CALL    60H
9026 DBFF       00350          IN      A,(255)     ;STILL SOUNDING?
9028 17         00360          RLA
9029 38EC       00370          JR      C,DEBNCE    ;YES, LOOP 'TIL QUIET
902B 23         00380          INC     HL          ;NO, INC. COUNTER
902C 18E4       00390          JR      LOOP        ;LOOP BACK FOR NEXT SOUND
902E 0B         00400 NOSND    DEC     BC          ;TIME DELAY FOR NEXT SOUND
902F 78         00410          LD      A,B
9030 B1         00420          OR      C           ;MAX TIME?
9031 20DF       00430          JR      NZ,LOOP     ;NO, LISTEN SOME MORE
9033 7A         00440 RETURN   LD      A,D
9034 D3FF       00450          OUT     (255),A     ;MAKE SURE MOTOR IS ON
9036 C39A0A     00460          JP      0A9AH       ;RETURN TO BASIC
                00470                              ;  AND PUT COUNT IN USR
                00480                              ;  VARIABLE
9000            00490          END     ENTRY
00000 TOTAL ERRORS
```

```
DEBNCE 9017 00290   00250 00370
DOUBLE 900D 00230   00210
ENTRY  9000 00170   00490
LOOP   9012 00260   00390 00430
NOSND  902E 00400   00280
RETURN 9033 00440   00240
```

Sound Counter BASIC Listing

```
10 POKE 16553, 255 : CLEAR 500 : DEFINT
   A - Z : FOR X = 1 TO 57 : READ Z : A
  $ = A$ + CHR$(Z) : NEXT : X = FRE(A$)
   : X = VARPTR(A$)
15 POKE 16526, PEEK(X + 1) : POKE 16527
  , PEEK(X + 2)
20 DATA 33, 0, 0, 219, 255, 203, 119, 2
  2, 12, 40, 2, 22, 4, 23, 48, 35, 24,
```

```
  5, 219, 255, 23, 48, 23, 1, 0, 5, 205
  , 96
25 DATA 0, 122, 211, 255, 1, 0, 5, 205,
   96, 0, 219, 255, 23, 56, 236, 35, 24
  , 228, 11, 120, 177, 32, 223, 122, 21
  1, 255, 195, 154, 10
30 CLS : PRINT "SOUND DRIVEN GAME SCORE
  R" : PRINT "BY JAMES F. WILLIAMS" : P
  RINT : INPUT "NUMBER OF PLAYERS"; N
40 FOR X = 1 TO N : PRINT "NAME OF PLAY
  ER"; X; : INPUT N$(X) : NEXT
50 CLS : PRINT "DIGIT ENTRY" : PRINT :
  PRINT "1 = ONE CLAP" : PRINT "2 = TWO
   CLAPS" : PRINT "." : PRINT "." : PRI
  NT "." : PRINT "9 = NINE CLAPS"
55 PRINT "0 = TEN CLAPS" : PRINT "NEGAT
  IVE SIGN = ELEVEN CLAPS" : PRINT : IN
  PUT "PRESS ENTER TO CONTINUE"; X
60 FOR Z = 1 TO N
70 CLS : PRINT CHR$(23) : FOR X = 1 TO
  N : PRINT N$(X), S(X) : NEXT : PRINT

80 PRINT "CLAP 3 TIMES FOR "; N$(Z) : P
  RINT
90 X = USR(X) : IF X <> 3 THEN 90 ELSE
  T! = 0 : S = 1 : PRINT N$(Z); " ";
100 U = 0
110 X = USR(X) : U = U + 1 : IF X = 0 A
  ND U < 150 THEN 110 ELSE IF X = 0 THE
  N 140
120 IF X > 11 THEN 70 ELSE IF X = 11 TH
  EN S = - 1 : PRINT "-"; : GOTO 100 EL
  SE IF X = 10 THEN X = 0
130 T! = T! * 10 + X : PRINT MID$(STR$(
  X), 2, 1); : GOTO 100
140 PRINT : PRINT : PRINT "CLAP 3 TIMES
   TO CONFIRM" : U = 0
150 X = USR(X) : U = U + 1 : IF X = 0 A
  ND U < 150 THEN 150
160 PRINT : IF X <> 3 THEN PRINT "NOT C
  ONFIRMED" : FOR X = 1 TO 1000 : NEXT
  : GOTO 70
170 PRINT "CONFIRMED" : FOR X = 1 TO 10
  00 : NEXT : S(Z) = S(Z) + T! * S : NE
  XT : GOTO 60
175 '*********************************
  **********************
180 'MAKE THESE MODIFICATIONS FOR DISK
  BASIC:
190 '   1. CHANGE LINE 15 TO:
200 '            POKE VARPTR(Z),PEEK(X+1
  ):POKE VARPTR(Z)+1,PEEK(X+2):DEFUSR0=
  Z
210 '   2. CHANGE THE "X=USR(X)" IN LIN
  ES 90, 110, 150 TO:
220 '            X=USR0(X)
```

■

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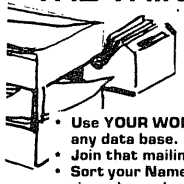

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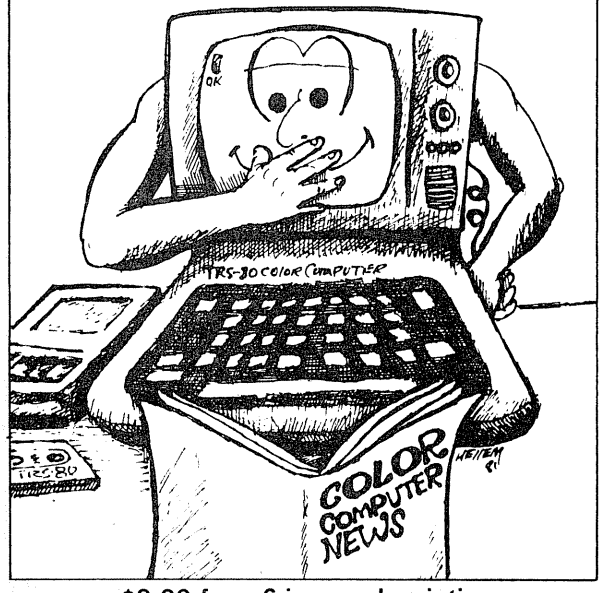

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Double precision function routines

For all models, tape or disk except the color computer

James E. King, Topanga, CA

Did you scientific TRS-80 programmers know that SQR, LOG, EXP and the Trigonometric functions still give single precision results even though they may be defined as double? The results appear to be double precision, but the last 10 digits are actually garbage.

This problem has prompted me to write subroutines that calculate these functions even though Radio Shack sells a similar version (part #26-1704 $9.95). The program was written for two reasons: the challenge and I'm too cheap to spend the money. The *Handbook of Chemistry* was used as a reference to locate the series expansions for all the functions except square root.

The six subroutines that perform these calculations use 825 bytes (14 lines), beginning at line number 9000. They are all modular: use only the routine that you need. They stand alone and do not call any other routines. The Radio Shack program calls parts of itself so you must load all of it.

The main program is set up as a calculator. Choose the function you want from the menu and enter the argument. The double precision answer will be checked for accuracy by both the single precision ROM (random access memory) call and the complimentary double precision routine. The number of iterations is printed just before the double precision answer to show how many times it looped. Note that the angular arguments (WA) are all in radians. If degrees are required, then multiply radians by 180/PI. A to the Xth power is included (using subroutines LOG and EXP) in all but the square root. The subroutines loop until the difference between two successive answers is zero.

Square root is found by Newton's method:

$$W1 = (WO + W/WO) / 2$$

where W is the input, WO is the first estimate and W1 is the next closer approximation. It turns out that Newton's algorithm converges so fast that if WO equals the result from the single precision ROM call, iteration occurs only twice to achieve 16 digit accuracy (line 9000).

The series expansion of the natural log is implemented in lines 9020 and 9030.

The series expansion of E to the Xth power (EXP) is implemented in lines 9040 and 9050.

Sine and cosine were done together because it is necessary to force the input angle to within 2*PI radians. This is accomplished in line 9060. Line 9080 implements the series for Sine and 9090 the series for Cosine.

Tangent is calculated by calling the Sin-Cos routine and then dividing (SIN/COS).

Arctangent is longer because different series are used for X<1 and X>1. Line 9130 implements X<1 and 9140 implements X>1.

Arcsine was added at lines 9150 and 9160.

Table I shows how to call the subroutines and use the additional variables. You must "DEFDBL W" just after string space is cleared and set WP = 3.1415926535897932. The variable "I" is used as a counter. The routines will run much faster and take less memory if you "DEFINTI". You can use "I" elsewhere because it is redefined in each of these routines. If "I" is holding a value in one of your routines, substitute another integer. All the subroutine entry points are indented one space (my own programming style).

Unfortunately, some of the routines take a large

number of iterations to converge to a solution: EXP and LOG for arguments far from 1, and ARCTAN and ARCSIN near 1. There are only three ways I know to decrease the time: (1) use quicker converging algorithms, (2) adapt the routines to use the single precision ROM output as the seed for the double precision solution and (3) write the routines in assembly language. I do not know of any faster converging algorithms or how to use the single precision output as a seed, so, writing them in assembly is one of my projects for the future.

The main advantages of these subroutines are: they are free (just type them in), take less space and you may use only the ones needed. This program is copyrighted with permission to use but not to sell. For your convenience, it is available on tape from ORION R&D, 20784 Medley Lake, Topanga, CA 90290 for $7.95. ■

Double Precision Function Routines

Variables/ Functions	Other Variables	GO SUB
WY=Sq. Root (W) Error Code if W<=0	None	9000
WY=Natural Log (W) Error Code if W<=0	I, W1, W2, W3	9020
WY=Exp(W)=E to the (W) power Overflow if ABS(W) > 87.33	I, W1, W2, W3	9040
WY=Sine(WA) W=Cos(WA)	I, W1, W3, W8, W9	9060
WA=Arctangent (W)	I, W3, W5	9100
WA=Arcsine (W) Error Code if W>=1	I, W1, W2, W4	9150

Double Precision BASIC Listing

```
0 CLS : PRINT "  DOUBLE PRECISION ROUTI
  NES, ANGLES IN RADIANS
(C) JIM E. KING, 1980, PERMISSION TO US
  E & COPY, NOT TO SELL" : GOTO 9
2 S = INKEY$ : IF S = "", 2 ELSE RETURN

3 INPUT " FOR DSQR(W>0), R="; W : RETUR
  N
4 INPUT " FOR DLN(X>0), X="; W : RETURN

5 INPUT " FOR DEXP(X<87.34), X="; W : R
  ETURN
6 INPUT " FOR DSIN(A) & DCOS(A), A="; W
  A : RETURN
7 INPUT " FOR DATN(X), X="; W : RETURN
8 INPUT " FOR DASIN(-1<X<1), X="; W : R
  ETURN
9 DEFSTR S : DEFINT I, L : DEFDBL W : W
  P = 3.1415926535897932
10 PRINT "SQ<R>OOT <L>OG <E>^X SIN&<C>O
  S ARC<T>AN ARC<S>IN A<^>X" : GOSUB 2
20 IF S = "R" GOSUB 3 : GOSUB 110 : GOS
  UB 9000 : GOSUB 310 : PRINT " ROOT^2=
  "WY * WY
30 IF S = "L" GOSUB 4 : GOSUB 120 : GOS
  UB 9020 : GOSUB 320 : W = WY : GOSUB
  9040 : GOSUB 330
40 IF S = "E" GOSUB 5 : GOSUB 130 : GOS
  UB 9040 : GOSUB 330 : W = WY : GOSUB
  9020 : GOSUB 320
50 IF S = "C" GOSUB 6 : GOSUB 140 : GOS
  UB 9060 : GOSUB 340 : : GOSUB 9100
: GOSUB 350 : W = WY : GOSUB 9150 : GOS
  UB 360
60 IF S = "T" GOSUB 7 : GOSUB 150 : GOS
  UB 9100 : GOSUB 350 : GOSUB 9060
: PRINT I/2"D SIN/COS("WA")="WY/W
70 IF S = "S" GOSUB 8 : GOSUB 160 : GOS
  UB 9150 : GOSUB 360 : GOSUB 9060 : PR
  INT I"DSIN("WA")="WY
80 IF S = "^" GOSUB 500
99 IF S = "/", END ELSE 10
110 U = SQR(W) : PRINT " SQR("W")="U"
  R^2="U * U : RETURN
120 U = LOG(W) : PRINT "     LN("W")="U
   : RETURN
130 U = EXP(W) : PRINT "     EXP("W")="
  U : RETURN
140 V = SIN(WA) : U = COS(WA)
: PRINT "     SIN("WA")="V; TAB(36)"COS
  ="U TAB(50)"TAN="V/U : RETURN
150 B = ATN(W) : PRINT "     ATN("W")="
  B : RETURN
160 V = ATN(W/SQR(1 - W * W)) : PRINT "
      ASIN("W")="V : RETURN
310 PRINT "DSQR("W")="WY; : RETURN
320 PRINT(I - 3)/2"DLN("W")="WY : RETUR
  N
330 PRINT I"DEXP("W")="WY : RETURN
340 PRINT I/2"DSIN("WA")="WY TAB(38)"DC
  OS="W
: PRINT "  DSIN^2 + DCOS^2 - 1 ="W * W
  + WY * WY - 1
: W = WY/W : PRINT "  DTAN("WA")="W : R
  ETURN
350 PRINT(ABS(I) - 1)/2"DATN("W")="WA :
   RETURN
360 PRINT(I - 3)/2"DASIN("W")="WA : RET
  URN
500 INPUT "A^X  A,X="; W, WX : W = ABS(
  W) : PRINT "A^X ="W^WX : GOSUB 9020
```

```
: W = WY * WX : GOSUB 9040 : PRINT TAB(
  17) CHR$(27)"DA^X ="WY : RETURN
9000 WY = SQR(W) : WY = WY/2 + W/WY/2 :
   WY = WY/2 + W/WY/2 : RETURN '-WY=SQR
  (W)
9020 W2 =(W - 1)/(W + 1) : W3 = W2 : WY
   = W2 : I = 3' - - - - - - - - - WY=LOG
  (W)
9030 W1 = WY : W3 = W3 * W2 * W2 : WY =
   WY + W3/I : I = I + 2 : IF WY <> W1
  THEN 9030 ELSE WY = 2 * WY : RETURN
9040 W2 = W : W = ABS(W) : W3 = 1 : WY
  = 1 : I = 0' - - - - - - - - - -WY=EX
  P(W)
9050 W1 = WY : I = I + 1 : W3 = W3/I *
  W : WY = WY + W3
: IF WY <> W1 THEN 9050 ELSE IF W2 < 0
  THEN WY = 1/WY : RETURN ELSE RETURN
9060 WA = WA/2/WP : WA = WA - FIX(WA) +
   1 : WA =(WA - FIX(WA)) * 2 * WP : WY
   = WA : W = 1
: W8 = 1 : W9 = WA : I = 1 : I2 = 1' -
   - - - - - - - - - - WY=SIN(WA) W=COS(W
  A)
9080 W1 = WY : FOR I1 = 1 TO 2 : I = I
  + 1 : W9 = W9 * WA/I : NEXT : I2 = -
  1 * I2
: WY = WY + I2 * W9 : IF WY <> W1 THEN
   9080 ELSE I = 0 : I2 = 1
9090 W3 = W : FOR I1 = 1 TO 2 : I = I +
   1 : W8 = W8 * WA/I : NEXT : I2 = - 1
   * I2
: W = W + I2 * W8 : IF W <> W3 THEN 909
  0 ELSE RETURN
9100 W2 = 1/W : W3 = W : I = 3 : IF W =
   1 OR W = - 1, WA = SGN(W) * WP/4 : R
  ETURN
9120 WA = W : IF ABS(W) > 1 THEN WA = S
  GN(W) * WP/2 : I = 1 : GOTO 9140'- WA
  =ATN(W)
9130 W5 = WA : W3 = W3 * W * W : WA = W
  A - W3/I : I = - 1 * SGN(I) *(ABS(I)
  + 2)
: IF WA <> W5 THEN 9130 ELSE RETURN
9140 W5 = WA : WA = WA - W2/I : W2 = W2
  /W/W : I = - 1 * SGN(I) *(ABS(I) + 2)

: IF WA <> W5 THEN 9140 ELSE RETURN
9150 W4 = .5 : I = 3 : W1 = W * W * W :
   WA = W + W4 * W1/I' - - - - - - WA=A
  RCSIN(W)
9160 W2 = WA : W1 = W1 * W * W : W4 = W
  4 * I/(I + 1) : I = I + 2 : WA = WA +
   W4 * W1/I
: IF WA <> W2 THEN 9160 ELSE RETURN
```

■

Quirks & fixes

Things they never told me . . .

For Model II

Rupert N. Evans, 1842 Maynard Drive, Champaign, IL 61820

Every machine and almost every program has some quirks that the seller never mentions. The designers or manufacturers know about some of these, but they may choose not to tell you for various reasons; the cost and delay in reprinting an instruction manual, for instance. Others are accidental or unknown and you may be the first one to discover that something happens when it shouldn't—or that something doesn't happen when it should.

These quirks are part of the software or hardware and may affect many users. Others are unique to your own machine or your program and will apply only to you. When you start to write with the TRS-80 model II, you will find quirks of both types. The secret is to anticipate these quirks and then to find ways of getting around them.

Unique Quirks

It is essential that you read the directions first. Otherwise, you may damage both software and hardware. The old adage, "If all else fails, read the directions!" has no place around computers. If you still have a problem after carefully rereading the directions, the next step is to make sure that everything is plugged in properly. Then, "If all else fails, find someone who has a machine and software like yours and see if he has the same problem." This new adage will help you isolate unique quirks.

If the other machine, using your program, does not have your problem, then you have a unique quirk in yours and it needs to be fixed. That means that you need a trouble shooter. Whole books have been written about trouble shooting, but this article has a different subject. If you are not an electronic expert, be glad that you bought a Radio Shack product. Their repair service is usually fast and dependable.

If your machine, using a different copy of the same program, does not have the same problem, then you probably have a piece of bad software. This may be solved by making a backup copy of the good program or you may have a bad diskette which should be replaced.

If another machine has the same problem that you did, using several copies of the program, then you may have either a software or a hardware quirk which is built-in. Unfortunately, the help you can get from Radio Shack on problems which are built in to their hardware and software is not as dependable nor quick as their machine repair.

Built in quirks of the Model II

The Model II is a complex machine which has complex software. It is a good rule of thumb that every new system will have a few bugs in it. This is why I waited a year to leave my Model I for a Model II. It turns out that a year was not enough. True, I avoided the fiasco of the Daisy Wheel Printer I and its successor. (I have had no problems with the Daisy Wheel II.) I also avoided the horrors of TRS Disk Operating Systems 1.0, 1.1 and 1.2.

TRSDOS 2.0 is excellent and version 2.0a is even better. My knowledge of TRSDOS 2.0a and Scripsit 1.0a was acquired the hard way. Six months ago I received a nice letter asking me if I wanted updates on my Radio Shack software. (This is one of Tandy's nicest characteristics. They keep providing improved versions of their hardware and software, usually at no charge.) This time, however, they goofed. I have scrounged updated copies of everything, but the local store claims that nothing for me has been sent to them from Tandyland. Curious!

Quirks of TRSDOS 2.0

The Data Transfer Package for transferring programs from the Model I to the Model II works fine for TRSDOS 1.2 and 1.2a, but it does not work for versions 2.0 and 2.0a. If you don't have a copy of TRSDOS 1.2a, you should get one just for this purpose and use the XFERSYS command to convert the transferred files to the new DOS. If you can't scrounge a copy of version 1.2 or 1.2a, if you will send me a large stamped, self-addressed envelope with 40 cents worth of stamps on it, I will send you an 11-step procedure for transferring BASIC programs and a 19-step procedure for transferring Scripsit programs directly to TRSDOS 2.0a.

The Model II Debug command will not let you look at, or modify, memory below 2800H (10240 decimal) or above F3FFH (62463 decimal). *80-U.S.* magazine for May/June 1981 (page 122) and July/August 1981 (page 14) tells how to install Peek and Poke commands in place of OCT$ and NAME. These will let you look at and change anything. For convenience, the patch is repeated at the end of this article.

I use the TERMINAL command to get library information for my writing, via modem and telephone. The local network requires that a hexadecimal 03 be transmitted in order to sign on. Page B/1 of the Owner's Manual should have an asterisk after the word "BREAK", as it does on page 5/3 of the TRSDOS section. This would call attention to the footnote. <Break> sends out '03H from keyboard, but it

is intercepted before it gets out of the machine. <Ctrl C> does put '03H out to the modem.

Don't be surprised when you get a "Boot Error, PI" when you turn on your machine. This error (and a few others) can be caused by small particles of corrosion on the cable connectors. Usually this corrosion may be removed by unplugging and reinserting the offending plug. I do this monthly for each connection. Don't forget the termination plugs if you use them. If this doesn't cure the problem, rub a soft pencil eraser over the male contacts. Carefully brush off any rubber crumbs and coat the male contacts with a tiny amount of a conductive lubricant such as Dow Corning Molykote Formula 4. We didn't pay for gold-plated connectors, so we need to do a little more work. Even the gold-plated computers sometimes have this same problem.

It is very easy to turn the power and reset switches off or on accidentally. One piece of soft eraser rubber placed above the reset and another one below the power switch will solve this problem. If you have the expansion disk system, its power switch needs similar treatment. Turning power switches on or off when a diskette is in place will often wipe out all of your programs. A single switch with outlets for both the computer and the expansion drive unit is a good investment. If this switch is protected by a $6.00 spike killer diode from your local electronics outlet, you have further protection against voltage surges on the line.

The last line of page 0/4 of the TRSDOS section of the Owner's Manual would be more helpful if it read as follows: "To delete files, use the command PURGE (ALL). The password for all systems files is PASSWORD."

If you connect the transfer cable between the Model I and the Model II using HOST ON under TRSDOS 2.0 or 2.0a, the Model II will lock up unless material is being transferred from the Model I. Start the transfer and *then* connect the cable. This procedure is not necessary if you use TRSDOS 1.2 or 1.2a.

Line 3 of page 2/49A of the TRSDOS section of the owner's manual should read as follows: "LIST file (PRT, SLOW, R=record number, A=display ASCII but not display hexadecimal code)."

Note 3 should be added at the end of page 2/55H of the TRSDOS section of the owner's manual: "3. In order to turn SETCOM OFF, you must first enter HOST OFF."

The first line of page 3/4 of the TRSDOS section of the owner's manual should read: "BACKUP (You must FORMAT before you can BACKUP. See page 3/8)."

Add the following sentence before the last two lines of page 3/25 of the TRSDOS section of the owner's manual: "In the program above, 'ENTER NEW CHAR VALUE IN HEX (2)' means to enter two hexadecimal digits."

Change "VERIFY . . . 2/4" on page 6/4 of the TRSDOS section of the owner's manual to: "VERIFY . . . 2/68."

See your Radio Shack dealer to get a PATCH for TERMINAL to decrease the number of parity errors you are receiving.

If your program calls for you to INPUT numbers and you type in letters instead, the computer prints "Redo from start", and inserts a line feed. Similarly, if you type in a

comma after the numbers which are called for, the computer prints "Extra ignored", and inserts a line feed. For some reason, the computer does not consider these to be errors, and will not trap them with the "On Error Goto" command. This may wreck a carefully prepared table on the screen. The solution is to use INKEY$ routines which trap or reject the unwanted characters.

If you are near the end or the beginning of a line and want to move the cursor to the other end of a line, move the cursor in the "wrong" direction and it will jump to the opposite side of the text. This is called "wrap around". It saves time.

When you are editing a line, the computer sometimes locks up. This occurs when you have pressed "I" for insert, have inserted some characters, and have backspaced to a point before the insert began. <Enter>, <F1>, <F2> and <Esc> are powerless and nothing can be typed in. Don't panic and reset the computer, thus losing all of your program. Instead, press <Control period> or <Control comma>. For some unknown reason, this unlocks the computer. Now, type A <Enter> to restore the line as it was before the lockup.

Quirks of Model II Scripsit Version 1.0a

<Ctrl L> is supposed to center a line which is followed by an <Enter>. If Mode O is on, <Ctrl L> usually moves the line too far right because it centers the line between the outline tab and the right margin, instead of between the two margins. The solution is to press <Ctrl O> before you type the line. This turns off the "outline tab" (Mode O), which indents a paragraph after each line feed. Then press <Ctrl L> to center the line, followed by <Ctrl O> to reset your normal handling of indentations. If you forget to do this before you type the line, put the cursor on the line, press <Ctrl O>, <Ctrl D>, P, and F. It is also a good idea to lock this recentered line with <Ctrl F>, P, and L. Otherwise, if you reformat during repagination, you will have to do all your recentering again. But, if you lock a line (or some larger block) which is single spaced and if you later want to change to double spacing, you will have to unlock the line first.

A similar problem sometimes occurs at the beginning of a page, when an indentation occurs which you don't want. The same solution is used except that it is not necessary to lock the paragraph.

The printer sometimes will feed several extra pages after having printed a page. After you have pressed <Ctrl U> followed by P to tell the computer that you want to print, specify a page length which is one line *more* than you used for pagination.

If you have a footnote which is to be used on only one page, you will need to follow it with a footer page which has one <Enter> on it. This will prevent your footnote from being printed repeatedly. The same procedure must be used for single headers.

If you have a footer or a header page and later add some material on a preceding page, repagination cannot be done properly. Scripsit looks at the extra material for the preceding page and decides that it should not be put on the footer page. Consequently, it creates a new, short page before the footer and renumbers all of the later pages. The easiest solution is to press <Ctrl D>, A or B (depending on where the cursor is), and M. This moves the short page into memory. Then, position the cursor at the start of the next page of text and press <Ctrl R> to recall the text from memory. Later, you will need to repaginate.

One of the nicer features of Scripsit is that it allows you to MOVE a portion of the text easily. However, you cannot MOVE text from one Scripsit diskette to another. To solve this problem you will need to put, on the same diskette, (1) the material into which you want to MOVE text, and (2) the material from which you want to take the text. Then, MOVE the text. Later, you can COPY the revised material onto another diskette, if you choose.

It is highly desirable to have Mode V set at all times so that you can see where you have line feeds, tildes and tabs. Press <Ctrl V> to turn it on or off. Look at the lower right corner to see if it is on.

Occasionally you will have a line which lacks a tilde (wavy mark) at the end. This can be added by pressing <Ctrl 6>.

To get to TRSDOS, which is hidden on a Scripsit diskette, press <Hold Enter> after the TIME query, during boot up. If you are in TRSDOS and want to get to Scripsit, enter STARTUP.

Unlike TRSDOS, it is not necessary, in Scripsit, for you to use the FORMAT command before you use BACKUP command.

If you haven't traded in version 1.0 of Scripsit for version 1.0a, you can count on having lots of problems with repagination. There is no charge for the exchange at your local Radio Shack store. Be prepared for a long wait, however, if they don't have it in stock. It pays to see if another nearby store does have it in stock.

Add the following note at the bottom of page 29 of the Scripsit instruction manual: "See *TRS-80 Microcomputing News*, February, 1981, page 3, for instructions on how to access ten different characters."

Quirks of Daisy Wheel Printer II

The manual says that when the printer stops because it has run out of ribbon, you cannot restart it, but must begin that page again. Not so, at least on my printer. You may, however, want to start the page again because the characters printed at the extreme end of a ribbon are sometimes very faint.

On some Daisy Wheel II printers, numbers are printed slightly higher than capital letters. This may not be noticeable unless capital letters and numbers appear next to each other. The Daisy Wheel has two concentric circles of characters with the numbers on one circle and the capital letters on the other. If the printer is misadjusted, characters from one circle may print at a different height than characters from the other circle.

Another typical misadjustment makes it difficult to insert the ribbon between the Daisy Wheel and the plastic paper guard. If the lower portion of some characters is not printing clearly, press the plastic guard toward the platen, to allow the ribbon to drop into place.

If you have a tractor and are using continuous form paper, it is a good idea to have a final header page with only a few <Enter> symbols on it. This gives you an automatic feed to the point where you can tear off your printout.

The Daisy Wheel II with tractor does not print superscripts evenly and does not return sharply after printing a subscript. In order to prevent the tractor and the friction feed from working against each other, the friction feed usually is

loosened when the tractor is in use. The tractor pulls the paper well, but doesn't push it. If you are using super and subscripts, it is a good idea to print one page at a time. Then tighten the friction feed at the beginning of each page which has super and subscripts, but release it at the end of each such page.

Use double line spacing for super and subscripts. They don't work well with single spacing because they are printed a half space up or down. This causes them to overlap single spaced lines above or below.

On page 14 of the manual for the Daisy Wheel II, place an asterisk after each of the two 10's in the decimal column.

On this same page, insert a 12 after the first 10, and in the column headed "Function," write in "Top of Form. LPRINT CHR$(12)". In other words, to send the printer to the top of form at any time, type LPRINT CHR$(12) <Enter>.

Because Scripsit has no global means of spacing down from the top of form before printing, some people use a header page with the required number of ENTERs to space each page down. This is obviously better than placing the same number of ENTERs at the top of each of many pages. But an even easier way is to set the printer to the top of form and then turn the platen to space it down manually. The printer will then start each page the same distance down from the top of the form.

Miscellaneous Notes

The Modem should not be connected to an interruptable telephone line. Such lines make a sound which interrupts a conversation to let you know that someone is trying to call you. The Modem does not know how to handle this sound, so it may print garbage, or may disconnect you from the computer to which you are talking. You will need to get a "teenager's" telephone for your computer, or stop paying the telephone company for the interrupt service.

If you wear trifocal glasses, it is difficult to look at both the screen and the keyboard. A separate pair of "reading glasses" which has a prescription halfway between the two most powerful parts of your trifocals is a good solution.

Conclusion

In spite of all of the suggestions I have made, I am convinced that the Radio Shack Model II is the best ten thousand dollar word processor and computer on the market. Because it sells for much less than ten thousand dollars, it is a remarkable bargain. Indeed, it is a better word processor than several which sell in the fifteen thousand dollar range.

I have used my Model II heavily for six months, writing letters, articles, monographs and a book. Not a single repair has been needed on the computer or its accessories. At first, I was unhappy about the greater cost of programs, but now I see that you get what you pay for. Compare, for example, the relative sophistication of the Model I and II Scripsit,' Profile and Statistical Analysis.

I still have not learned all there is to know about the Model II, but I know that I'll never be satisfied to go back to a simpler computer. Neither will you. ■

MiniGraf

For Models I, II and III

Jim Peyton, Georgetown, KY

You may have graphing programs by the diskful. Here is a miniaturized version which won't put a large bite (byte?) on your storage space. It holds a dozen items, just enough for a year's worth of months or whatever, and supports a range ratio of 1 to 50. All inputs are prompted. It even centers itself vertically on the screen.

For the Model II you will need to change the PRINT@ statement in the second line to (80*INT(12(I+1)/2)) + (31-LEN(A$)/2)) and the middle STRING$ statement in the third line to (50*(A(J)/C),147).

```
1 '      *****  M I N I G R A F  *****
2 '             BY JIM PEYTON
3 '             GEORGETOWN KY
4 '
5 CLS:CLEAR200:DIMA(13):PRINTTAB(20)"M
  I N I G R A F":PRINT:PRINT"GRAPH TITL
  E (ONE LINE OR LESS)":INPUT A$:INPUT"
  INPUT STARTING YEAR (ELSE HIT ENTER)"
  ;B:IF B=0 THEN B=1
6 I=I+1:PRINT"ITEM";I;"VALUE (TO QUIT H
  IT ENTER)";:INPUT A(I):C=(C+A(I)+ABS(
  C-A(I)))/2:IF A(I)>0 AND I<13 THEN 6
  ELSEI=I-1:CLS:PRINT@(64*INT((14-(I+1)
  )/2))+(31-(LEN(A$)/2)),A$
7 PRINT STRING$(62,61):FORJ=1TOI:PRINT
  @ TAB(6) STRING$(50*(A(J)/C),133) A(J
  ):B=B+1:NEXT:PRINT STRING$(62,61):PRI
  NT TAB(18)"TO CONTINUE PRESS ENTER";:
  INPUT:RUN
```

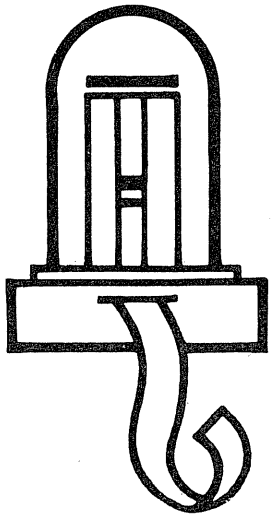
■

TRS-80 sensational software

creative computing software

Stock & Options Analysis

Cassette CS-3306 (16K), $99.95
Disk CS-3801 (32K), $99.95



Should you hedge, buy, or sell out? **Stock and Options Analysis** puts a securities advisor in your computer, providing you with four powerful investment tools. **Option** gives important indices for opening and closing call option transactions. **Opgraph** presents a graph or table of profit for any combination of long or short calls, puts, and stocks. This allows the detailed evaluation of three types of hedges. **Newprem** helps predict the future premiums of an option at any desired time and future stock price. **Portval** lets the computer do the paper work, providing full portfolio services, including value per share, current value, and capital gain. The program includes the effects of commissions, margin interest and dividends. Beyond helping to organize and evaluate your present portfolio, **Stock and Options Analysis** is an excellent aid for planning and testing future strategies. The comprehensive 24-page manual with this package not only shows how the programs work, but is also a primer on the strategy of hedging listed options against common stocks. This strategy has been repeatedly shown to actually be more conservative and more consistently profitable than straight buying and selling of stocks

Solar Energy Analysis

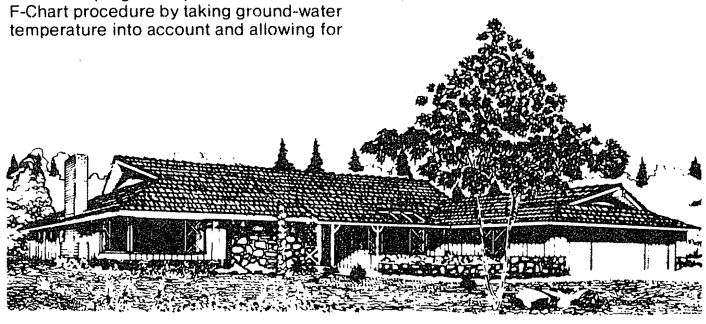
Cassette CS-3307 (16K), $49.95
Disk CS-3802 (32K) $99.95

Available 7/81

F-Chart Solar Energy Analysis eliminates many of the tedious calculations required when designing solar-heating systems. Beyond providing a thermal analysis, the program allows designers to quickly determine the effects of changing any specifications, allowing fast, accurate, and inexpensive experimentation.

Systems using air, liquid, or domestic hot water in any climate can be analyzed in detail. The program expands the traditional F-Chart procedure by taking ground-water temperature into account and allowing for mixing valves in domestic hot water systems. **F-Chart Solar Energy Analysis** quickly pays for itself by freeing you from time-consuming calculations.

The disk version of the program includes a data base of all necessary climatic data for any location in the United States. These data are in the printed booklet included with the cassette version but must be entered manually for your geographic location.

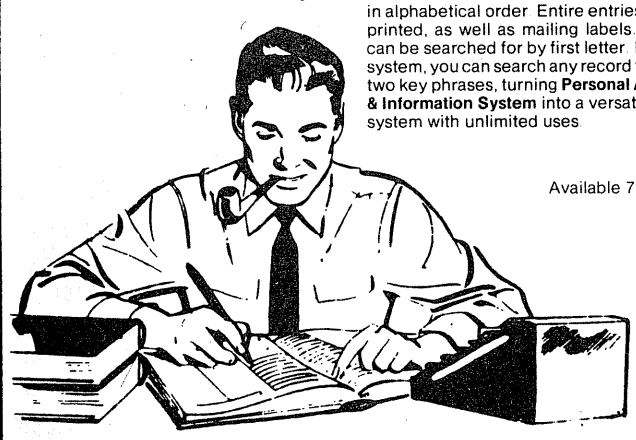


Personal Address and Information System

Disk CS-3509 (32K) $24.95

Is your address book beginning to resemble a heavily-edited inkblot? Do your friends keep moving, forcing you to cross out and rewrite addresses and phone numbers? Let the **Personal Address & Information System** turn filing drudgery into computing pleasure. You can store all the crucial information, including name, address, home and work phone numbers, spouse's name, and comments or remarks. At any time, the information can be edited or changed.

And there's more. Names can be sorted in alphabetical order. Entire entries can be printed, as well as mailing labels. Names can be searched for by first letter. In a 32K system, you can search any record for up to two key phrases, turning **Personal Address & Information System** into a versatile filing system with unlimited uses.



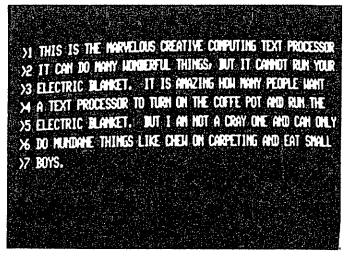
Available 7/81

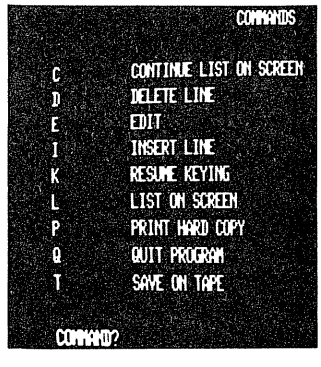
Text Processing

Cassette CS-3302 (16K) $14.95

CS-3504 Disk (32K) $24.95
(Disk includes Checking Account, CS-3304)

This program turns a 16K, TRS-80 and lineprinter into a line oriented text-processing system.





Developed exclusively for the TRS-80 this program lets you use the computer to enter general text or business letters, edit and modify your work, save text on cassette tapes, and print out a perfect report, document, or letter every time.

Editing commands are similar to those used in Level II BASIC, so there are no complicated new commands to learn. Lines may be either inserted or deleted. A special format is available to speed entry of business letters. Final printout can be done in numbered pages and you may print multiple copies.

Business Address & Information System

Disk CS-3510 (48K) $24.95 Available 7/81

Do you need quick access to business contacts and customers? Put more organization in your organization with the **Business Address & Information System**. A complete file containing company name, address, phone number, and comments can be quickly entered and stored. Information can be changed or edited whenever necessary. The program allows entire entries to be printed, and can also generate mailing labels.

When you need information fast, you can search for specific names or find all entries that contain one or two key phrases. Any key phrases can be used. **Business Address & Information System** will help you make the most of your time, putting the routine work in the computer where it belongs.

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Order today at no risk. If you are not completely satisfied, your money will be promptly and courteously refunded.

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In NJ 201-540-0445

creative computing software

TRS-80 is the registered trademark of Tandy Corp.

Circle #13

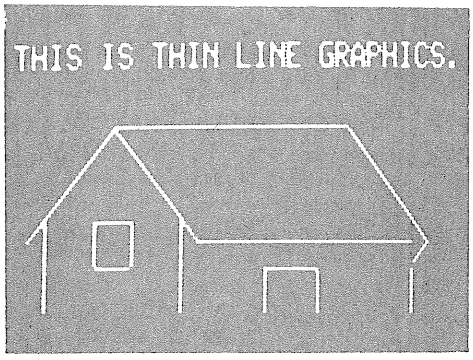
CG 16-Character Generator Kit
G. P. Associates
PO Box 22822
Sacramento, CA 95822
(916) 392-0257
Model I 4K and up
$64.50 + $2.50 s/h

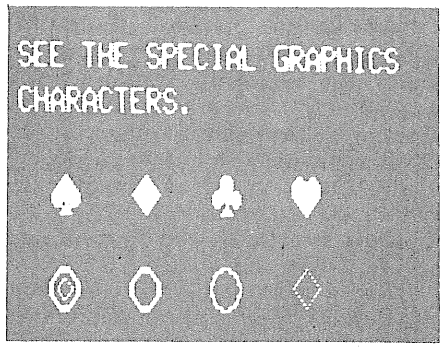
Several desirable internal modifications for the Model I TRS-80 are thin line graphics, lower case letters and special gaming and other graphics symbols. G. P. Associates' CG 16-character generator, which combines these features, sells for $64.50 plus about $20 more for the required Electric Pencil lower case modification. The character generator is compatible with Scripsit and Electric Pencil.

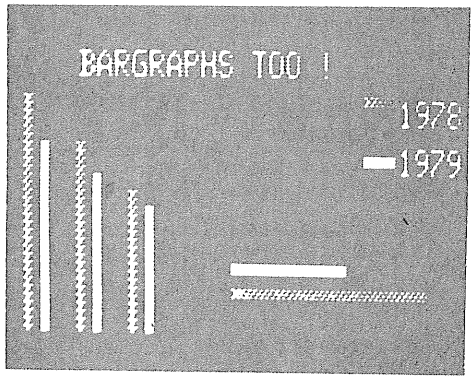
Hesitation in deciding to make modifications to electronic equipment is natural but the added capabilities and ease of installation are more than enough incentive for those questioning this kind of purchase. Besides reading the installation instructions before commencing, the biggest help for impatient computerists is having someone else read the directions and look over your shoulder as you go through each step.

Installation requires cutting nine traces and soldering 14 connections (including the Electric Pencil control key). The installation of the additional small circuit board requires removing the TRS-80 character generator and inserting the board into that socket, then reinserting the original character generator on the added circuit board. Installing the chip backwards doesn't harm anything but it won't work that way. For those who have Bill Archbold's older speed-up kit, only one wire needs to be moved. The new 3.5 to 5.3 Mhz speed-up kit needs no changes. Some may wonder how much work it is to restore a keyboard if repair is required. It's faster than whacking it up in the first place. It takes about fifteen minutes to unsolder this kit and bridge the traces again with insulated wire.

The lower case letters look better than those on the Model III high-resolution monitor. This is because the CG 16 makes each pixel round rather than oblong. The improved video display is apparent, no matter what characters are on the screen. The g, q, y, p and j tails are a full two pixels below the line. Some character generator chips used with lower case mods have the descenders only one pixel down so the CG 16's more attractive rendition is a plus. The newer Model I's manufactured in 1980 have a different character generator chip which causes the lower case letters to be displaced one scan line or pixel lower than the upper case letters,







numerals and punctuation. The old chip is Motorola part number MCM 6674 and can be purchased as a repair part from Radio Shack. Lower case characters are not as awkward-looking as the 'funny' letters in the old Electric Pencil modification displays but some might find it objectionable.

Also in the CG 16's repertoire are 'many' new characters that are programmable like the regular block graphics. There are a total of 256 characters that can be addressed with STRING$, CHR$, PRINT@ and PRINTTAB. These require a driver patch to the ROM video driver. Short BASIC and assembly patches are provided in the instructions and the BASIC patch is in the demo tape program included in the kit.

The additional characters include game symbols, half tone blocks, 1/4 tone blocks, three-pixel tall blocks (as opposed to the four-tall standard blocks), and forty single-pixel-thick straight line segments. These are all programmed as you would the regular TRS-80 graphics. Program changes are provided so several popular games can use the new high resolution game symbols.

Thirty-two electronic symbols are also available. For those who design electronic circuits or teach electronics with their TRS-80, these characters may be useful, but most people would get more use from their own 32 custom designed graphic symbols available for approximatly $30. These are in a 6 x 12 pixel matrix. Two 6 x 12 characters side by side fit in a square grid in the expanded mode (32 characters per line). A switch is provided to toggle between the regular and new character set.

There are some complications in using the driver patch. Some of the ROM locations of the new characters are also used by some of the EDIT subcommands. It is no problem to write a program in the first place, but when trying to debug it with the patch enabled, the EDIT command does funny things. You can get the keyboard so screwed up that BREAK, RESET and many other functions don't operate. Be sure to disable the driver patch when trying to edit a program.

The demo tape shows many applications of the new characters but apparently the tape was designed for a computer show. It cycles from one display to another, which is no problem. But all the programming is in PEEK and POKE, forcing the user to learn this method or not have the benefit of the examples shown. The manual gives only one line of BASIC program example.

The book, *TRS-80 Graphics*, by Don Inman is recommended for

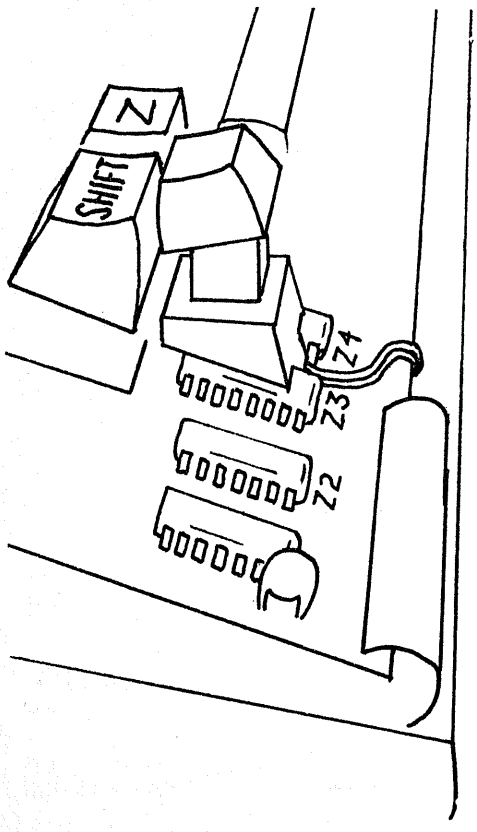
anyone who wants to learn either standard or CG 16 graphics programming.

There are those who have the newer metal frame keyboards and don't use the Electric Pencil control key because it is difficult to mount on the metal frame. The diagram with this review shows how to modify the key base to fit between chip Z3 and Z4 on the keyboard circuit board, below the left hand shift and Z keys. This is a very convenient location. It can be attached with silicone or otherwise glued into place.

I have found the CG 16 to be a very desirable addition to my TRS-80. From the lower case letters and high-resolution video display, to the thin line graphics and special characters, it greatly enhances the abilities and quality of the machine for a modest cost.

Brian Wood

A razor saw or hack saw blade may be used to cut wedges from both sides of the control key base. The solder lugs on the bottom are bent parallel to the key base to allow it to fit close to the circuit board.



The Systems Guide to FIG Forth
C. H. Ting, PhD
Offete Enterprises
Available from:
Mountain View Press
PO Box 4656
Mountain View, CA 94040
(415) 961-4103
$25.00

How do you build or modify a Forth system without knowing exactly how it works inside? The answer is *very carefully* unless you already have Ting's book.

The Systems Guide to FIG Forth is a detailed look into the inner workings of the Forth Interest Group's Forth (FIG Forth). As such, it is better than any other document available for explaining how Forth really works. However, even though Ting presents a clear and concise explanation of the FIG Forth system, it isn't really an amateur's book. It is more of a manual for FIG Forth's concepts and construction.

The book's chapters contain: Language Definition of Forth; FIG Forth: an operating system; Text Interpreter; Address Interpreter; Compiler; Error handling; Terminal I/O; Numeric conversions; Dictionary; Virtual memory; Defining words and the CODE field; Control structures and immediate words; Editor and Assembler.

This book makes more sense after reading other material available — especially while following through a listing of FIG Forth. Ting's examples are drawn primarily from Forth as implemented on Digital Equipment Corporation's PDP-11. Fortunately, they aren't essential to the understanding of the book.

This manual is recommended to those building a FIG Forth system. For those not planning such a system, it still may be useful in that it shows how the Forth Interest Group solved their problems.

T. R. Dettmann

Invitation to Forth
by Harry Katzan, Jr.
PBI Books
Available from:
Mountain View Press
PO Box 4656
Mountain View, CA 94040
(415) 961-4103
$18.50

A major drawback in the Forth area has been books that were understandable to the beginner. Katzan has taken a good step along the way towards making Forth available to more than just the advanced programmer.

Invitation to Forth starts out with a chapter on the Forth concept. After this simple introduction to the language are two chapters explaining how computer hardware and software functions. The next chapter is devoted to Reverse Polish Notation (RPN), followed by the details of making Forth work.

Katzan's book is a mixture of a good and bad explanation of how Forth works. Most of the explanations are simple and short; they can help form a good basis of understanding if the reader is willing to spend the time. However, a beginning level programmer may be only confused with the concepts of MAR's and MDR's. I personally didn't have any problem following the book as everything was familiar in one way or another. However, I wonder how useful it is to talk about microcomputer architecture at this level.

My only complaint is that although there are some simple illustrations, they aren't really extensive enough to be useful. There are no detailed examples of Forth programming.

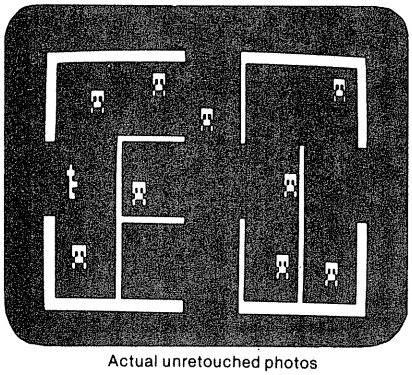
Overall, the book can be recommended as one of the simplest, least painful ways for the beginner to be introduced to the Forth language.

T. R. Dettmann

WHY IS THE ALPHA JOYSTICK SUCH A SUCCESS ?

Because of games like these.

NEW! TALKING ROBOT ATTACK



Actual unretouched photos

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TALKING ROBOT ATTACK

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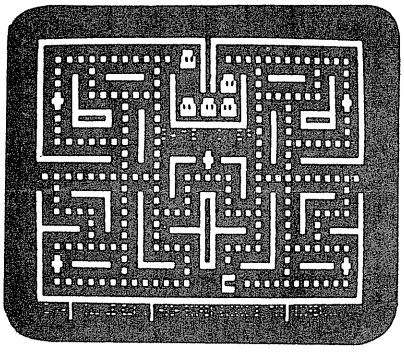
NEW! SCARFMAN



NEW! SCARFMAN

THE LATEST ARCADE CRAZE now runs on your TRS-80.

It's eat or be eaten. You control Scarfman around the maze, gobbing up everything in your path. You attempt to eat it all before the monsters devour you. Difficulty increases as game progresses. Excellent high speed machine language action game. From The Cornsoft Group. With sound.

CAUTION: Played with the Alpha Joystick, Scarfman may become addictive.

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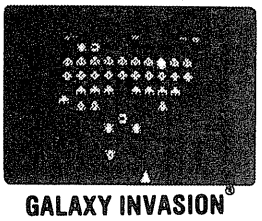
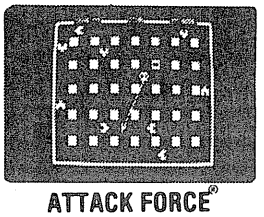
Asteroids float ominously around the screen. You must destroy the asteroids before they destroy you! (Big asteroids break into little ones.) Your ship will respond to thrust, rotate, hyperspace and fire. Watch out for that saucer with the laser! As reviewed in May 1981 Byte Magazine



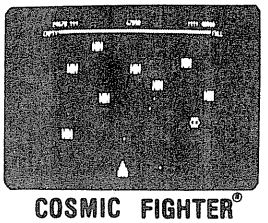
GALAXY INVASION®

The sound of the klaxon is calling you! Invaders have been spotted warping toward Earth. You shift right and left as you fire your lasers. A few break formation and fly straight at you! You place your finger on the fire button knowing that this shot must connect! With sound effects!



ATTACK FORCE®

As your ship appears on the bottom of the maze, eight alien ships appear on the top, all traveling directly at you! You move toward them and fire missiles. But the more aliens you destroy, the faster the remaining ones become. If you get too good you must endure the "Flagship". With sound effects!



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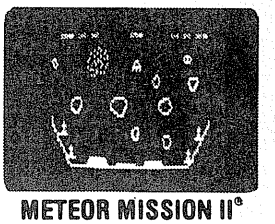
Your ship comes out of hyperspace under a convoy of aliens. You destroy every one. But another set appears. These seem more intelligent. You eliminate them too. Your fuel supply is diminishing. You must destroy two more sets before you can dock. The space station is now on your scanner. With sound!



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As you look down on your view, astronauts cry out for rescue. You must maneuver through the asteroids & meteors (Can you get back to the space station?) Fire lasers to destroy the asteroids, but watch out, there could be an alien FLAGSHIP lurking. Includes sound effects!

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- Saves your keyboard
- Fun to experiment in BASIC. Simply use A=INP(0) to read the joystick
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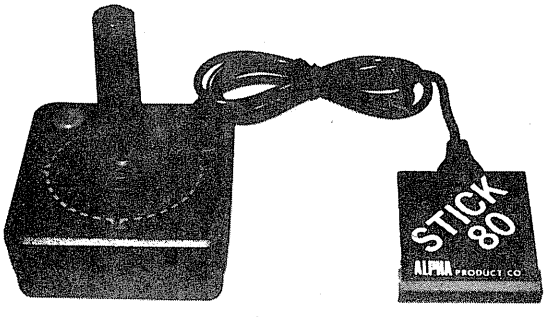

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Circle # 5

ALPHA Products

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@News

Stringy Floppy owner's news

Jim Perry

Back by popular request! I managed to miss deadlines for both the Nov/Dec and January issues of @NEWS, but I'll try not to let it happen again. The @NEWS office (my bedroom) has moved to Silicon Valley, so if you feel the urge to write, even a slight urge, use 181 Commercial Street, Sunnyvale, California 98046 - my bed is literally in a corner of the Exatron factory, while I find a place to live!

The list of addresses for saving commercial software in the Sep/Oct 81 column was so popular that I'm making it a regular feature in @NEWS. With a three-month backlog of tips, patches and news to try to get through, I'm going to hold the word-processor reviews over until the next installment.

@LOAD One

Later than originally planned, but better late than never, @LOAD One is now available. If you ordered it and it has not yet arrived, call Exatron on the hot line. If you didn't order a copy, you are really missing out on some excellent software.

@LOAD One contains four programs from the ESFOA Library (actually seven, as one is a set of four "dumb" programs), and two bonus CAI, public domain programs (received from the San Mateo Office of Education, "SOFTSWAP" division).

The first program, written by Mike Pelt, is a utility called String Packer. With it you can create complex screen formats, with graphics and text, and "pack" each screen into 15 string variables. The packed strings can then be used by your programs, producing extremely fast screen changes. File two is called UNLIST, written by Dave Dickerson, and is a mystery program. So not to spoil it, I'll just say that it gives your TRS-80 a lot of "character."

The third ESFOA Library program is a "Mastermind" program, and was written by Carl Kaminski. As a fourth program, Wee Willy managed to sneak in a set of four "dumb" programs under the names of PUZZLES. (He called them "dumb", not me — I think they are pretty smart!)

As a bonus there are two Computer Assisted Instruction (CAI) programs, Fastmath and Reducing, from the new Exatron Educational Software Library (more details on this later). Fastmath, written by Nancy Sandler and modified by Gerold Melin, helps students develop speed in math problem solving. Played by two students, they have to answer problems correctly and as fast as possible to keep their opponents score down. The final CAI program, originally from CUE/Asilomar (modified by Dave Hildebrandt), is Reducing — it drills young students in reducing fractions.

Free Software!

If you didn't order @LOAD One, and would like a copy, it's available for $9.95 (includes tax, postage — everything!). Actually, all the programs are free, the $9.95 is to cover production and mailing costs only.

As mentioned earlier, there is a new Educational Software Library at Exatron, full of public domain CAI software. Any school purchasing a Stringy will receive a free package of Library CAI software. Schools already having a Stringy can get the same package for $9.95. As has always been Exatron policy, all Library software is free — you only pay for production costs.

Cheap software!

Many readers have written to say that they didn't realize how much software was available from Exatron — at last count there were more than 60 titles available, with more being added each week. If your catalog is more than six months old, call for a new one. We include a current copy with every order.

One of the latest programs (so new it's not in the catalog yet), and in my opinion one of the most useful, is DUMP+ZAP. This $9.95 program is in fact a set of four machine language utilities which allow you to display memory locations on the screen. In less than ten seconds you can scroll through a full 48K of memory, with all memory contents displayed in hexadecimal and ASCII. DUMP only displays memory, ZAP can alter memory as well as display it.

Vanishing act

Dr. Lichen Wang, the author of the Stringy operating system, described the following hardware modification at a recent ESFOA Workshop. It was written up by Mike Van Pelt.

The modification allows you to display the odd-numbered video locations when you are in the double-width display mode. An unmodified TRS-80 will only display the even locations.

1. Find Z43 in the keyboard. Cut the trace from pin 5 to ground — on both sides of the circuit board.
2. Connect a jumper lead between Z43, pin 5 and pin 7 of Z59.

The modification is now complete! It may be the simplest there is. Now the "2" bit of port 255 will switch the display between odd and even locations when in 32-character mode.

From READY, type POKE 16445,8 — this puts the computer into 32-character mode, displaying even locations. POKE 16445,10 will do the same for odd locations in RAM — everything printed while in even mode will vanish instantly. In BASIC programs you can experiment with OUT255,X with 0, 8 and 10 for X. Happy vanishing!

Two-way aid

In the last @NEWS, Gary Dixon asked about the Graphics Editor program (Jan/Feb 81 *80-U.S.*). The program's author, Bill Mason, says that a simple patch is to delete line 40, and set memory size to 31667 before activating the Stringy with /12345.

This month it was Gary's turn to help other readers, he sent in the following letter about Level III BASIC:

"Level III is an excellent program, I especially like the custom single-key command function. However, I found

it tedious having to enter all the custom commands, every time I loaded the program (@LOAD, @SAVE, FOR X = 1 TO and several others).

At first I tried to @SAVE the customized version, using the addresses in the ESF User Manual, to no avail. After Level III loads, it relocates itself in memory. So by using the ESF-80 Monitor, I looked through memory to find out where it had moved itself. The running program needs the following to @SAVE it, @SAVE1, 16896,5591,16896 — and you will have your personally customized Level III BASIC, with a simple @LOAD1."

Help wanted

Programs which have defeated owners include:
Fairway - 80, Lemonade and **Proball - 80**, from Brookstone Associates.
BASICPro, from Softworx.
Olympic Decathalon, from Microsoft.
Cosmic Patrol and **Air Traffic Control**, from Instant Software.
Space Invaders, Pigskin and **Pinball**, from Acorn.
MBL Baudot and **M80 2.1**, from Macrotronics.

If you have transferred any (or all?) to wafer please let me know.

Next month

Well, that's all I can squeeze in this month — but going monthly means information will be much more up to date. A Model III Stringy? Color Computer Stringy? Find out next month. ■

Circle # 69

Scripsit Spelling and Hyphenation Dictionary
Radio Shack 26-4534
$199.00 Model II
2-disk, 64K systems

The Scripsit Spelling and Hyphenation Dictionary program from Radio Shack introduces a very large (100,000 word), rapid spelling checker for the Model II. We used this program to check many articles and were very impressed.

Description and Installation

The program and word list reside on one eight-inch diskette which is to be used only on an external drive. It has no operating system and comes complete with its own three-ring binder and set of instructions. The directory for this diskette resides on track one and contains no alternate directory. Care must be taken, therefore, when formatting diskettes for backup use with this program.

Installation of the program entails modifying the Scripsit 2.0 and dictionary diskettes for the needs of the system. Prior to use, one must decide if the optional user list of words is needed. This list makes it possible to add up to 2,047 words which are not found in the dictionary's master list. Modification of the two diskettes is handled through a command program and is virtually automatic.

The manual, although only 19 pages, is complete. In some places it is difficult to follow due to brevity, but is generally self-explanatory.

The program does not distinguish between lower and upper case letters. It will not locate grammatical errors or errors associated with words used in the wrong context. An interesting explanation on word variations is worth repeating here: "Most words have a basic word, or root from which they are derived. The word remains recognizable even when the derived word is used in a different sense or in a different way. For example, a verb may change to either indicate tense or a different part of speech.

"These changes are often shown by the addition of affixes to the root. Thus our vocabulary is vastly increased and it becomes impossible for any dictionary to contain all the variations of all words." Then follow *thirty* variations of the word *like*. Quite an eye-opener! There is, unfortunately, no indication of whether these words are coded, as with Cornucopia's Microproof, or are compressed in a literal form.

Operation

The *only* way this dictionary may be used is by calling it directly from Sciprsit 2.0. This is done by pressing control-U, S or, as an alternative, the Escape key, U and S, in that order. Once the actual program starts, the screen will display the starting time, the page being checked and a word count of those not found. After locating all of the bad words and while returning to Scripsit, the program will display the total number of words in the text and the ending time on the video. Scripsit will scan the pages of text and highlight (in reverse video) the first word not found.

At this point the operator will be given the following opportunities: to correct the spelling, add the word to the user list, flag the word for later processing, delete the word or skip it and go on to the next. Correction and addition features offer the opportunity to either correct the spelling or add hyphenation points. A final opportunity is given to check for correctness.

Flagging a word places the plus/minus symbol in front of it for use after all of the unknown words have been highlighted. Word(s) in question may be further processed manually using the global search mode of Scripsit. Deleting and skipping words are handled with the F2 and down-arrow keys.

The manual fully explains two methods used to protect a block of text from being checked for correctness. An operator may want to do this when there are a lot of very technical terms which might not be found in the program's dictionary.

Findings

There are some limits to the dictionary. One is the 2,047 word user list described earlier. Another is the limit of 1,500 words not found. This latter limit may be overcome by pressing the Break key, processing the words up to that point and then rechecking the document.

The user list would not accept words with embedded numbers, such as in NEWDOS80. The user list accepted NEWDOS without hesitation. The problem was solved by changing all references to NEWDOS80 to the more correct form, NEWDOS/80.

We used Lawrence Charters' text, *Help For A Dead Language*, as a test for this spelling dictionary. All the words Lawrence had flagged as incorrect, *except* the word *irregardless*, were located. *Irregardless* is considered nonstandard because it is redundant according to the unabridged version of *The Random House Dictionary of the English Language*. Nonetheless, it does creep into the English language. The words *ain't, yup* and *nope* were checked and all but the word *yup* were accepted. Unfortunately, there is no way to delete unwanted words from the dictionary.

Hyphenation

The hyphenation portion of this package is a separate program and appears to be the first of its type for the Model II. It adds automatic hyphenation capabilities in accordance with established rules: no more than two consecutive lines may be hyphenated; capitalized words, the last word in a paragraph or a word which is not in the dictionary or user list may not be hyphenated.

Hyphenation takes place when these rules and the conditions concerning a *hot zone* are met. The *hot zone* is the number of available spaces a line must have before the program considers hyphenation. This is set to three, but may be changed to any number from one to nine by means of a patch to the program.

Conclusion

The size of the dictionary and the speed with which the text is checked are impressive. Certain words are included in the dictionary which we feel should not be there. Since they are seldom found in written text, they do not pose a major problem in using this program. In our opinion, Tandy has produced an excellent addition to the Scripsit word processor for the Model II.

Tom Huber

Star Scout
Adventure International
Box 3435 Longwood, FL 32750
(800) 327-7172
$14.95 Model I/III tape 16K
$20.95 Model I disk 32K

Star Scout is based on the ever popular Star Trek game. In this version, you are the commander of a scoutship with the task of defending the Inner Orbits against the invading Zargonians. The Confederation has developed a new secret weapon which will enable you to destroy the enemy base planet. However, there is one minor problem — the weapon is now disassembled. Each of the ten space stations scattered throughout the galaxy contains one component of the planet-killer; if only someone could secretly visit all ten space stations and pick up the ten parts of the weapon. Once assembled, the base planet could be destroyed, and with extreme luck, the 30 Zargonian warships could be hunted out and decommissioned.

That is the basic plot of this real-time space game. The galaxy is contained within a 20 x 20 grid and the ship can maneuver one sector at a time. The player is provided a view of the ship's instrument panel, which contains a view screen showing what is happening outside the ship, a weapons status board indicating the operational readiness of your torpedoes and the number of pieces of the planet killer that have been picked up. A communications window displays various messages, a shield status indicator shows the strength of both shields, a star clock shows your remaining time and a location indicator gives your coordinates. A torpedo counter and enemy counter are featured and a long range scanner gives you information on the four quadrants around the ship. A stations visited board reminds you which stations have been visited and a galaxy map shows where the ship has journeyed so far.

The pilot must search each sector for a space station and, if found, must dock with it to pick up a new piece of the weapon. The pilot must also worry about such trivial matters as running out of fuel before docking with a station, thereby ending the mission, or engaging an enemy warship in combat. Being a scoutship, the only advantage is speed and it must be exploited to survive the warship's superior firepower. Once engaged in battle, there is no escape — it is a battle to the death. The view screen shows the position of the enemy and, by using the arrow keys, can be lined up in the crosshairs for a torpedo shot.

The game has some very good features and is quite cleverly done. The graphics are excellent and the sound effects are very good. There is even an opening theme song from Star Wars. There is a save game feature. There are 20 levels of difficulty and a few unexpected surprises, such as an enemy space station disguised as a friendly one.

The galaxy map is hard to use and is not documented at all in the instructions. It is actually turned around, but a little thought will enable you to use it for its intended purpose. Overall, this is one of the best Star Trek-type games around. It is also available for a 16K Level II machine with some features lacking to make it fit into the smaller memory size.

Jim Klaproth

Spectral Associates
145 Harvard Avenue
Tacoma, WA 98466
TRS-80 Color
$21.95

When Color Meteoroids is loaded and running, look around to make sure you are in your own home and not in an arcade. The high-resolution graphics make this game very realistic and competitive with the arcade version. Every detail is clearly seen, right down to the tiny gun on your spaceship.

Meteoroids appear from the sides of the screen and flow very smoothly on different trajectories. As the meteors are hit with your photon torpedoes they split into two smaller sizes before they can be destroyed completely. When you fire and hit a meteor, a small bit of space debris appears for about a second around the destroyed rock and then fades from the screen. You will have to be sure to avoid the debris for it can destroy your ship if you get too close. This adds an extra dimension to the game because you cannot destroy a meteor that is very close to your ship without taking a chance of destroying yourself in the process.

Be alert for any alien ships which may appear on the screen. They come directly out of hyperspace and are much more accurate than the arcade version. These aliens will steer right for your ship until you either destroy them or they destroy you.

The difficulty level of the game determines how long an alien ship will stay on the screen, how fast it moves, how many torpedoes it fires, and how often it will appear. This feature is very convenient because it allows you to get used to the game before committing yourself to more serious warfare.

Two joysticks are required for use with this program and each performs specific functions. The right joystick controls thrust and the joystick button acts as a trigger enabling you to fire photon torpedoes. Firing will be continuous if the button is held in the down position. The left joystick controls gun positioning and the joystick button controls the hyperspace mode. Hyperspace will relocate the ship randomly on the screen each time it is used. Be careful when entering hyperspace. Re-entering the screen at or near the vicinity of a meteoroid may result in destruction.

Using both joysticks simultaneously to control the game presents quite a challenge. There is the tendency to forget the functions of the controllers, but this is a good challenge for your manual dexterity. Control is not impossible, but you might prefer to have one person control the gun and thrust, while another controls direction of motion and the hyperspace function.

The sound effects for this game are somewhat limited. According to Spectral Associates, this is because the computer's central processing unit (CPU) must control all of the game functions. When the CPU is making a sound it cannot do anything else. It must stop screen action, make the sound and then return to the game. With the short sound used in this game, no adverse effects are noticed on the screen.

Overall, Color Meteoroids is an excellent game - even better with two people at the controls. It is much more challenging than the arcade version and you don't need quarters to get your initials on the screen.

Space Invaders
$21.95

When I reviewed the new Space Invaders game for the TRS-80 Color Computer, the first question that came to mind was, "Is it as good as the arcade version?" If this game was installed in a Space Invaders cabinet very few people could tell the difference.

The game starts with a wave of invaders in an array eight wide by six high. Each horizontal line of invaders has a different form of movement, exactly like the original arcade version. The invaders move sluggishly at first (left to right), with a slow rythmic pounding sound, then increase their speed as they are destroyed. Ten points are scored for destroying invaders in the bottom rows, twenty points for the next two rows and thirty points for the top two rows. A bonus of 500 points is awarded for destroying a complete wave of invaders.

Your base (at the bottom of the screen) is moved from left to right using the right joystick. The right joystick button fires missiles at the attacking invaders, who drop about twice as many bombs as the arcade version. The left joystick controls perhaps the best feature of this new game: a shield! The shield is a bit tricky to adjust, but once set, your base can sit close to it and destroy the invaders quickly. The shield does, however, give you a false sense

of security because an exploding bomb will render it inoperative for about three seconds. So, if two bombs are dropped on top of the shield at the same time, one will go through.

The left joystick button activates hyperspace. Pressing it causes the base to be relocated somewhere on the bottom of the screen. This is the only feature of the program I don't like. The shield adds adequate protection without taking away the excitement of the game but, whoever heard of a base going into hyperspace? Also, it would be nice to have some kind of indicator on the screen to tell which wave of invaders you are dealing with.

The game also has a mystery invader who takes the place of one of the regular invaders and is identifiable by his erratic pulsations. He is worth 100 points and is usually in the middle of the pack, so if you want to pick up the extra points be prepared for a shootout!

Both games are good examples of the Color Computer's high resolution graphics and game capabilities. I hope Spectral Associates continue writing programs like these.

Rich Rehaume

Cognivox VIO 332
Voicetek
P.O. Box 388
(805) 685-1854
$149 plus $5 shipping

Model I, 16K Level II

I recently bought the Cognivox VIO 332 from Voicetek. Impressive as this unit is, the voice quality is not quite up to that offered by Texas Instruments. This is understandable, however, as the software is written for non-DOS (disk operating system) use and the I/O (input/output) speech drivers reside in low memory.

It is no problem to relocate these drivers so that the disk operating system would not overwrite them. Also, the BASIC execution program was easy to modify for use with Disk BASIC.

The manual is well written and easy to use. It shows how to incorporate the speech recognition and voice response into user programs. Programs that come with the Cognivox are VOX2, the machine language I/O driver; PROG2, an executive program to help teach the capabilities of the VIO 332; DIALOG, a program which will allow you to carry on a conversation with the computer; MUSIC, a program which will let you play three songs through the VIO 332; and a game which uses speech recognition and voice response.

The words which Cognivox is to say and recognize must be loaded with the drivers. Voicetek does not currently offer a disk version, but it may not be too long before they do.

I am working on a way to save the words and tables created by the Cognivox programs on disk. In all, I have had a lot of fun with this little goodie. It has provided for a lot of learning experiences and even a few frustrations. The possibilities seem to be endless.

At $149.00, this unit is a bargain. I feel that you will not be disappointed in the performance and can easily recommend it for anyone who is even slightly interested in speech I/O for computers.

Richard G. Hale

Threaded Interpretive Languages
R. G. Loeliger
Byte Books
70 Main Street
Peterborough, NH 03458
$18.95

Forth is not an easy language to write about. *Threaded Interpretive Languages* is an attempt to rectify at least part of this problem. It presents everything necessary for someone to design and implement their own threaded interpretive language. Loeliger's examples follow his own experience in developing implementations of Forth for his computer. Most of the examples are directly related to that development.

If you are familiar with computers and how they work you should find Loeliger to be understandable with little effort. He is able to interpose a little humor into a book which is about a relatively dry subject — designing a computer language.

The book is now serving as a principle reference for design of an implementation of Forth on Radio Shack's Color Computer. Since each step is laid out clearly in the book, it is easy to follow in his footsteps even on another system.

Threaded Interpretive Languages is highly recommended for those wanting to build a Forth system or just wanting to know the details of how Forth works.

T. R. Dettmann

The Power Pack
Computerware
1512 Encinitas Blvd. Box 668
Encinitas, CA 92024
$199.95

SDS80C
Micro Works, Inc.
P.O. Box 1110
Del Mar, CA 92014
(714) 942-2400
$89.95

Several months ago I started looking at machine language development packages for the TRS-80 Color Computer, one of the first things I looked for was an assembler. As new as the system is, it's probably not surprising that there isn't much out on the market yet.

It wasn't long after I started looking that I found we had received the Power Pack for review. I was overjoyed! Once I got the system, which consists of a ROM pack and a tape with the editor and assembler on it, I got busy with some testing in earnest.

As simple tests built up to more complex ones, I found that the Power Pack was a powerful system with a lot of built in features to make it easy to use. The Power Pack itself is the heart of the system.

The Power Pack has a 2K EPROM monitor located at $C000 through $C7FF and 6K of low powered static RAM located at $D000 through $E7FF. It is possible to purchase the listing for the color monitor for $15.00.

The monitor has the ability to examine and change memory and registers, locate byte patterns, go to user programs, handle breakpoints, dump memory, use RS232 devices and much more. For any serious assembly language programming you need these features.

The color editor that works with the ROM pack is a line oriented, tape based system. It has the normal functions for inserting, deleting and replacing lines as well as characters. I found it very easy to use.

The color assembler is a three-pass assembler that works off tape. It accepts the standard Motorola mnemonics as well as some useful pseudo-ops.

Overall, I was impressed with the power pack but distressed at several features. First, nothing runs without the power pack in, so I couldn't have just an editor or assembler unless I also had the power pack.

Second, the editor and assembler aren't included in the power pack but are separate tapes. The manual indicates that this is so we can have more software for less money once we have the power pack. The increase in inconvenience, however, is intolerable. Even so, lacking something better, it is worth using.

It wasn't long after I started that the SDS80C system arrived from Micro Works. I have to be honest, I was immediately impressed by the fact that the SDS80C system was all in a ROM pack! What's more, the whole system is integrated to the extent that once started, you can give simple commands to move from monitor to editor to assembler and back again.

With SDS80C, the editor works like a screen editor in that you don't worry about which line you're on. You just position yourself with the arrow keys and proceed to do your editing. There are still line oriented commands, but they are much easier to use.

Everything you need to do can be done with the SDS80C system, however it has fewer commands available in the editor and in the monitor than Power Pack. ABUG (the monitor) allows executing object programs, examining and changing memory, display registers, transfer memory blocks and more. Within these functions there is no problem in doing most normal development work.

If your problem exceeds the capabilities of either of these packages, then you should really have a cross-assembler on another machine.

A supporting package (available separately for $49.95) that I found useful with the SDS80C system is their disassembler. What can you say about a disassembler other than it works and helps you figure out how things are working. The manual even includes a listing of the disassembler itself.

The disassembler has a variety of formats adjusted to the assembly language programmer's needs including a cross reference listing, several listing modes and ability to disassemble areas of memory by the type of information stored there. The manual also has a wide range of information on the Color Computer including interesting addresses in the ROM and notes on how to use things like the PIA's.

In summary, I have to say that I liked working with the SDS80C system best. I found the editor easier to use and the whole system more acceptable since it was an integrated package. I am not saying that the Power Pack system is any less capable. It is a nice system that I found easy to use, but I personally liked the SDS80C system best.

T. R. Dettmann

BASIC Scientific Subroutines
Volume I
Byte Books
70 Main Street
Peterborough, NH 03458
$19.95

This book has been written for the serious microcomputer user. The text contains 65 different subroutines which will meet a variety of needs. Major topics covered are plotting, complex variables, vector and matrix operations, random number generation and series approximations. Later volumes are expected to deal with approximations, regression, interpolation, integration, root-finding and optimization.

All subroutines are thoroughly tested and written to be compatible with both the North Star and Microsoft BASIC. Each subroutine is discussed in theory, demonstrated by example and listed completely., All routines are extensively remarked to help the reader, but this is not meant to be a text on how to program in BASIC. Well-written appendices give complete, compact listings which help save memory. Indices of programs are given by both number and function. Conversions necessary to run under differing dialects of BASIC are also supplied.

All subroutines are coordinated to work together. The use of variables for arrays, indices and temporary values is kept consistent throughout all routines. Some consideration has been given to the processing speed but, in general you can expect the routines to run much slower than on a compiled system. The author also takes care to point out the precision of all calculations and the accuracy which will result from a given process.

The plotting subroutines are for one and two-dimensional graphs as well as a general function grapher. The routines make use of the PRINT and TAB functions and TRS-80 users should realize that these were written with printing terminals in mind and should adjust the PRINT statements to LPRINT statements as needed.

For users of complex variables there are a number of available routines such as addition, subtraction, division, multiplication, powers and roots and conversions to spherical coordinates.

If you have a need to work with vectors or matrices, the following functions should be of interest. You can add, subtract, compute norms, compute angle and cross or dot products between two vectors. For matrices you can add, subtract, multiply, transpose, diagonalize, swap, multiply by a scalar, clear, switch rows, find determinants (up to 4 x 4), invert, find eigenvalues and raise to powers.

Random number generation is discussed in detail and a variety of distributions are available. You can access a uniform, linear, normal, Poisson, Binomial, exponential, Fermi, Cauchy, Gamma, Beta or Weibull distribution.

The final chapter gives a discussion on series approximations. Included are series subroutines for summations, sine, cosine, arctangent, natural and common logarithms and the powers of ten and e. There is also a section

that tells how to extend these series to compute the hyperbolic and inverse hyperbolic functions.

The discussions in this text are clearly written and the routines well-developed. I highly recommend it to those readers with a need for such calculations.

Cameron C. Brown

Datapro Directory of Microcomputer Software
Datapro Research Corporation
1805 Underwood Blvd.
Delran, NJ 08075
(800) 257-9406
$340.00 per year

Datapro is a division of McGraw-Hill, one of the world's foremost publishers of technical and non-technical books and magazines. Furthermore, Datapro is a research company. When you buy this directory, you are buying a total information service which includes a subscription to keep the directory up to date with monthly replacement sheets, additions and a newsletter.

What's in the directory?

The first division in the directory is a user's guide followed by the inquiry service section. The inquiry service can provide information supplemental to that published, technical and analytical data on newly announced products and advice regarding a specific software-related problem. The user has three avenues open to him: telephone, Telex or mail. While there is no limit to the number of times this service may be used within the subscription year, problems which entail additional *original* research may require an additional cost to the subscriber.

The next four divisions are general indexes: Application/vendor, Product name/vendor, Vendor/product, and Computer/application/vendor. These index the directory locations of the detailed software product profiles. The fourth index, in addition to computer makes, also includes the CP/M operating system; the major program compiled languages (COBOL, FORTRAN and Pascal) and some of the processors (1802, 6502, 6800, 6809, 8080/8085, 8086/8088, and 9900).

The eighth section serves as an introduction to the next 27 product profile sections. These 27 divisions are by major application area.

The second volume contains pricing information by vendor and product name. This section is more complete than any of the previous product indexes. However, it is very compact. Product name and price are the only two items included in the 80 pages of this section.

The next five sections contain vendor profiles on existing and new companies. The following section details the name and address of all vendors and their authorized outlets. Two listings are provided: alphabetic (all outlets) and geographic (headquarters only) by postal code.

To round out the service, there is a section on user ratings of proprietary software (very limited in scope as of this writing); feature reports on software concepts, how to buy software packages, and contracts for acquiring software packages; vendor listing forms for software and vendors not included in the service and a final section for the monthly newsletter.

Comment

The microcomputer itself is no longer a "home" or "personal" computer. IBM's entry is certainly not a hobbyist machine. Pricing, service and software are aimed directly at the business user. Radio Shack's Model II falls into this same category. These are small business computers and that is what this directory and service are all about.

There are 54 manufacturers of computers with 130 different models represented in this directory. The majority are currently available machines from many companies. Only one Japanese manufacturer was listed.

Obviously, this service is not for everyone. Most small businesses will find the information is far beyond anything they will ever need. Those who will gain the most from it will be the data processing and computer science departments and libraries of colleges and universities; research libraries and data processing managers of medium to large departments.

We were somewhat pessimistic at the price and literature concerning this product. It was a pleasant surprise to discover the depth of value in this research aid. This software directory is well worth the $340.00 price. **Tom Huber**

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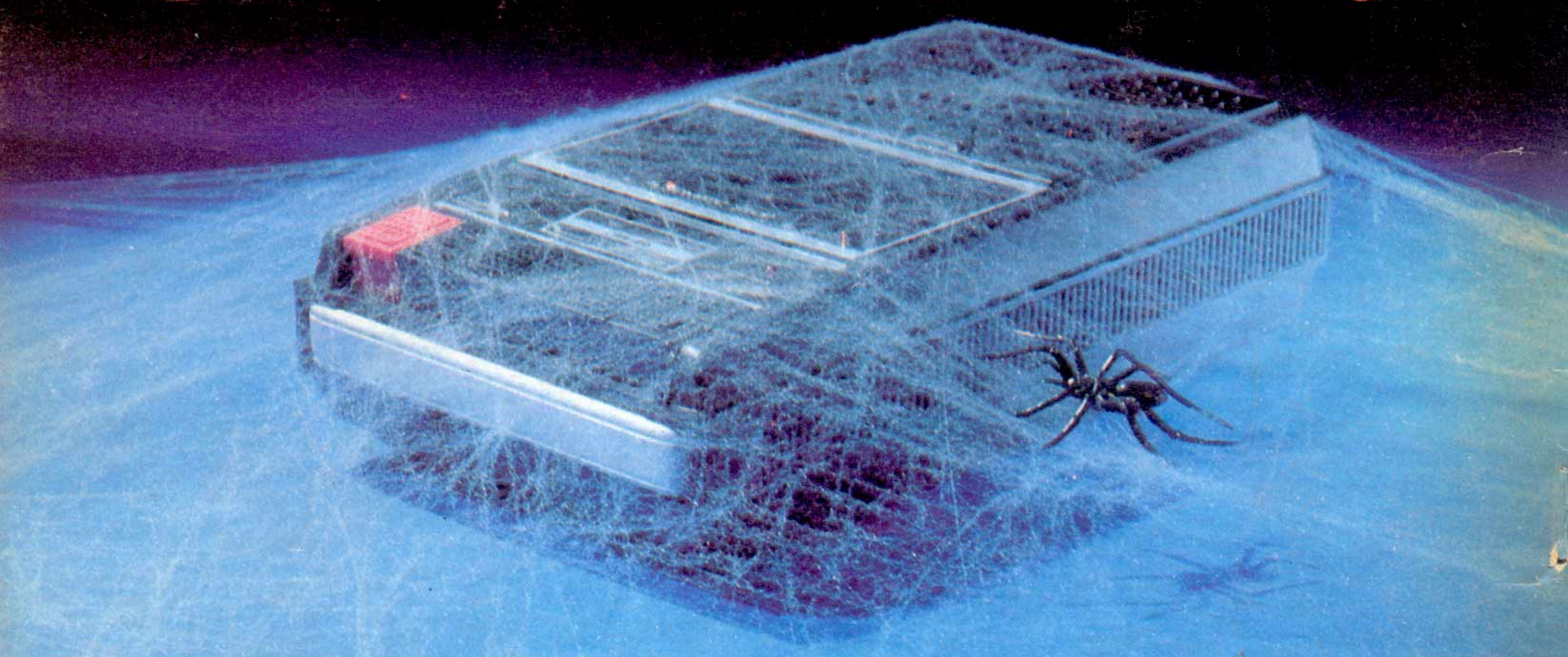

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